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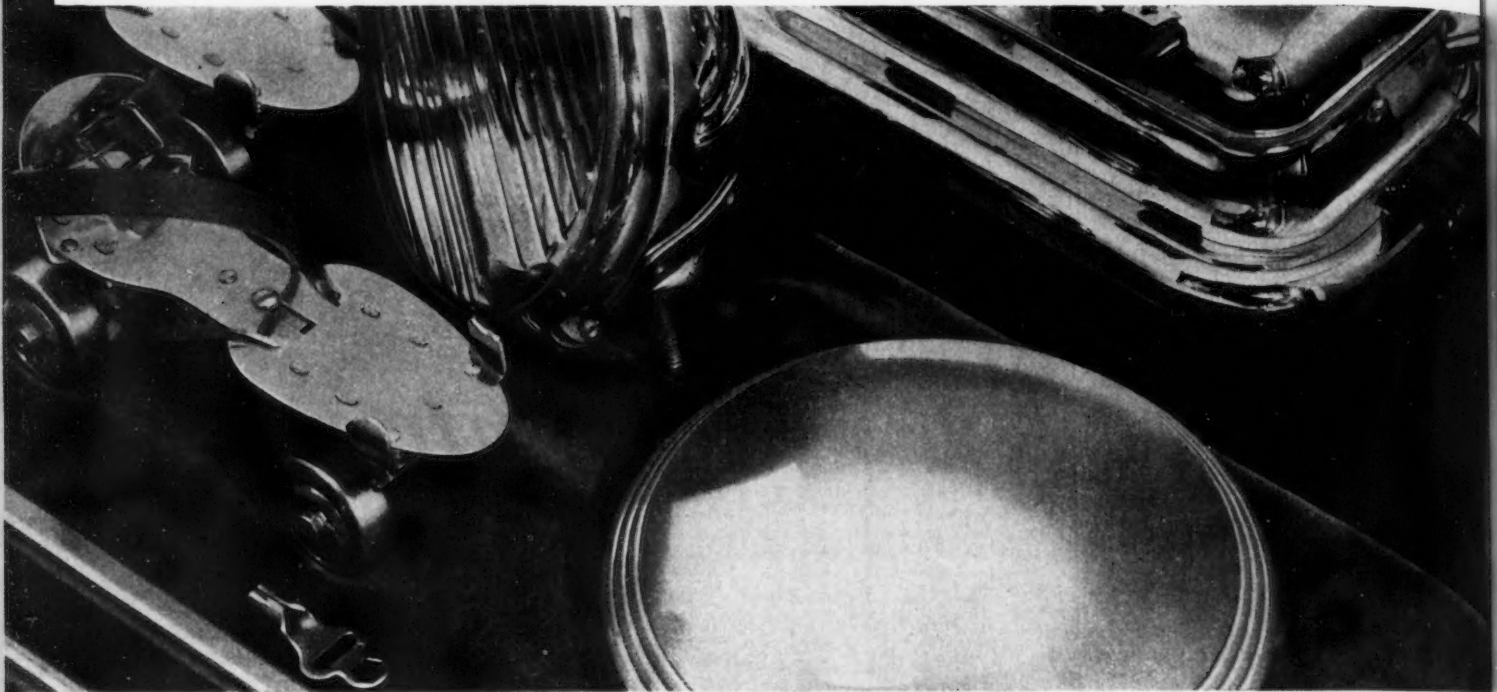
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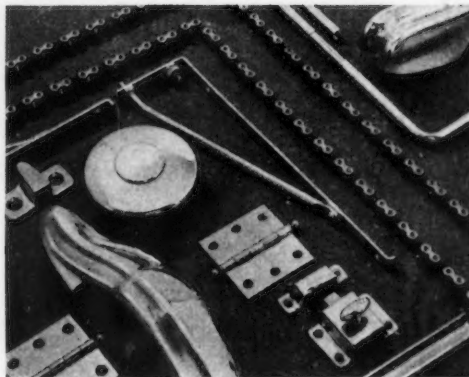
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JANUARY 25, 1940

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SO BIG!

ABE LINCOLN had the rare gift of combining wit and wisdom. A friend, poking fun at Lincoln's unusual height, once asked him how long he thought a man's legs should be. Lincoln replied: "Long enough to reach the ground."

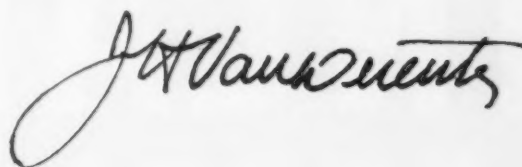
That was a *practical* answer. Some others, less wise than Lincoln, might have mentioned a definite number of inches as the proper length, forgetting that Mother Nature intended that some men should have long legs and some short ones.

Today some of our New Dealers are asking: "How large should a company or corporation be permitted to be?" If we had Abe Lincoln with us today, I think that his answer would be: "Large enough to best serve the interests of the public."

Lincoln would not have been likely to try to put an arbitrary limit on the size of our industrial concerns, expressed either in the number of men employed or in the number of dollars of business done per year. He would know that in the nature of things, some undertakings must be done on a large scale while others can be done properly on a small scale. He would realize that the Infinite Wisdom which created the universe saw no need for size regimentation in either celestial bodies or the earth's creatures. Witness the difference in physical stature between the whale and the honey bee. Both have their uses.

"How large should a company or corporation be permitted to be?" Is the Ford Motor Co. too large, or the United States Steel Corp., or American Telephone & Telegraph Co., or General Motors? It is true that you do not hear such questions from the people who work for these concerns, or from the customers who purchase their products and services. The chap who steps on the starter button of his V-8 does not say to himself: "Perhaps I would get a much better car for my money if Ford were limited to employing 30,000 men instead of 90,000." When you pick up the receiver to get a long distance call the thought does not occur to you that you might get better service at less cost if your call went through 10 or 12 companies instead of being handled by one. No, the everyday man and woman are not asking that question.

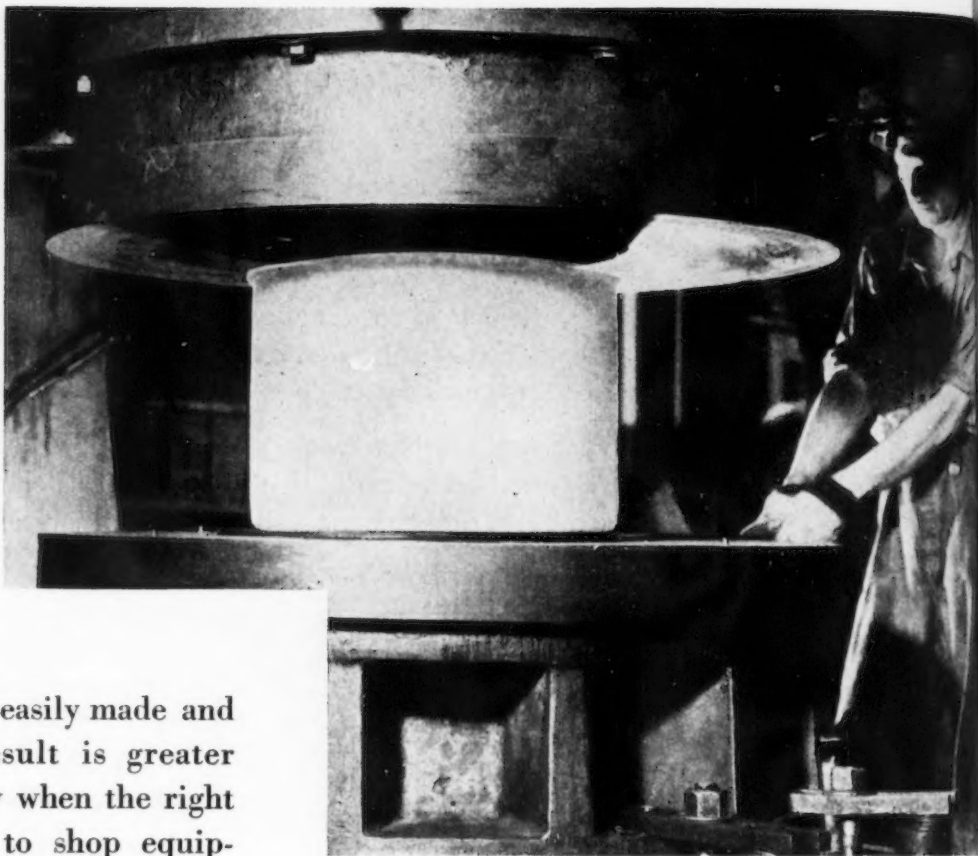
How big should an industrial concern be permitted to be? Big enough to best serve the public interest. And the definition of that size cannot be made intelligently by legislators. It is best made by the public which buys the product.



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Copper in Cast Iron...

By TOM BARLOW

Engineer, Copper Iron and Steel
Development Association,
Cleveland

ALLOY irons are undoubtedly becoming of increasing importance both to the engineer and to the foundryman, although in innumerable cases unalloyed irons are used successfully. There is a growing tendency on the part of the engineer to demand either special physical properties or soundness in increasingly intricate designs, and for both of these purposes foundrymen have learned to depend more and more on various alloys. Unfortunately, no cure-all has yet been found, and until that time comes, it is necessary to have at least a general knowledge of the effects of the individual elements in order to use them most economically. After all, economy is an essential part of metallurgy and of good foundry practice. Alloys or combinations of alloys are worth while in the foundry only when they can *increase the profit, decrease the loss*, or otherwise

ONLY recently has the use of copper in gray cast iron received much attention in print even though its use has progressively grown. The function of copper in iron as a mild chill reducer and controller, a pearlite stabilizer, a strengthener and a hardener are all described in detail herein, in this the first section of a two-part report.

show an increased economy for the foundryman or the engineer.

Engineers do not and will not write costly specifications unless they are convinced that the increase in physical properties or engineering properties is actually saving them money. Likewise,

the foundryman cannot use alloys unless he offsets their cost either by an increase in the selling price or a decrease in the other foundry costs.

Until recently, the use of copper in gray cast iron has received very little publicity although copper cast irons have had extensive use for many years. That the use of copper in the foundry has grown strictly on its own merit speaks well for its value to the foundryman. Nevertheless, the copper producers, who have been cooperating for the past eight years to determine, among other things, the effect of copper in alloy cast iron, have now set up a service and development office to make this information available. From a long program of research at Battelle Memorial Institute in Columbus, Ohio, sufficient data are now available to show what copper does when added in small percentages to gray cast iron. This research is, of course, being con-

tinued because it is only by research that the metallurgist can keep in step with the increasing demands of designing and mechanical engineers.

Mild Chill Reducer

Copper in cast iron is essentially a mild graphitizer or chill reducer. Its effectiveness in this regard can be estimated from the following relative empirical values for graphitizing power:

Silicon 1.0	Manganese —0.25
Aluminum 0.5	Molybdenum —0.35
Nickel 0.3 to 0.4	Chromium —1.00
Copper 0.25 to 0.35	Vanadium —2.00 to —4.00

Manganese, chromium, molybdenum, and vanadium have negative graphitizing values as they are carbide stabilizers and have an effect on chill opposite to that of copper.

Although the relative graphitizing values just given are the best obtainable and are based on recent research in this country and in Europe, they must be used with discretion, taking into account the characteristics of the individual elements as well as the basic analysis of the cast iron. For example, silicon up to nearly 3 per cent acts as a softener or graphitizer in ordinary cast iron, regardless of the original microstructure of the iron. (This graphitizing effect is much more pronounced than the strengthening effect of the silicon on the ferrite, but under some circumstances, particularly in very low carbon iron, the strengthening effect of the silicon can be utilized.) However, silicon not only breaks down carbide and reduces chill, but at the same time tends to break down pearlite to give free ferrite, thereby graphitizing all sections of the casting with a corresponding weakening effect on the heavier sections together with increased porosity and poor wear resistance. Frequently, shrinkage trouble results when silicon is added in excess of the amount required to maintain a pearlitic structure in the section involved. When silicon is used to graphitize thin sections to eliminate chill, the heavier sections of the castings are almost invariably softened beyond the point of pearlite and frequently show porosity.

The chill reducing effect of copper is utilized in many applications, particularly in light castings to be machined. For example, in small pistons it is often difficult to maintain the desired degree of machineability in the light sections and simultaneously obtain the required density in the heavy lug sections of the same casting. Cop-

¹ "Ford Alloy Castings," by R. H. McCarroll and J. L. McCloud, *Metal Progress*, 1936.



A HIGH carbon, high silicon gas furnace section containing from 0.50 to 0.75 per cent copper and 0.30 to 0.50 per cent chromium for the purpose of increasing heat resistance and reducing growth under conditions involving rapid variations in temperature. Photo courtesy Forrest City Foundry Co., Cleveland.

per up to 1.5 per cent has proved very effective in such cases. There are many similar applications in which copper is used successfully as one method of eliminating an annealing treatment of gray iron castings to maintain the proper degree of machineability. When the use of copper prevents scrap or eliminates the necessity for heat treatment, the cost of the copper is more than compensated for by a reduction in scrap losses or heat treating costs.

Pearlite Stabilizer

Copper has practically no effect on the breakdown of pearlite. Although it reduces chill in the lighter sections, it does not weaken or soften the heavy sections of the same casting. Thus it has an evening or leveling effect that is utilized in castings of intricate design in which it is desirable to maintain uniform properties throughout

the castings, regardless of the changes in the section size. Because copper is effective in breaking down excess carbide, reducing chilled corners, and eliminating hard spots in cast iron, it reduces the hardness of light sections which would otherwise tend to be mottled or white. At the same time, copper strengthens and hardens the pearlitic matrix of cast iron and refines the graphite structure in heavy sections. When copper is added to a casting having both heavy and light sections, it promotes greater uniformity in both physical properties and structure throughout the casting. It is therefore referred to as decreasing the section sensitivity, increasing section uniformity, or "stabilizing" the pearlitic structure.

A quotation from a recent paper by McCarroll and McCloud of the Ford Motor Co.,¹ which uses nearly six tons of copper per day in alloy steel and

iron castings, illustrates the pearlite or structural stabilizing effect admirably.

"For cylinder blocks it is generally recognized that the hardness in the bore must be maintained high enough to resist wear of piston rings, and we find that copper additions make such iron more machineable. The graphite also has a more finely divided character; copper has what may be described as a stabilizing effect on the graphitization of carbon. This is evi-

'openness' or porosity. We find copper even more satisfactory than nickel for these effects and at less cost."

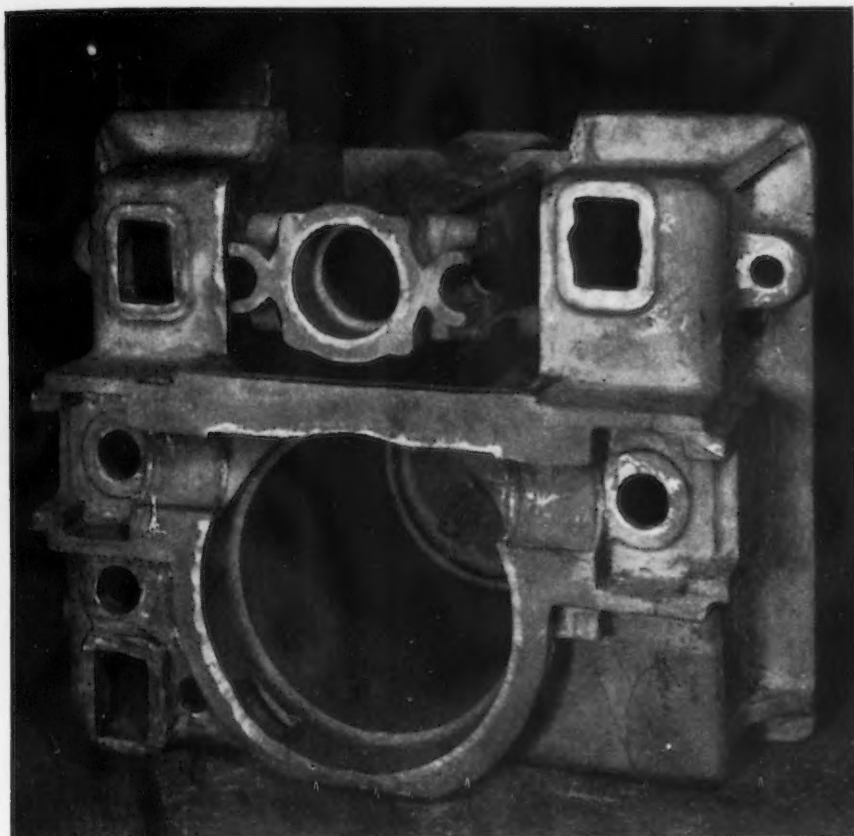
The structural stabilizing effect of copper is equally applicable to many other castings requiring density, machineability, and uniformity, such as pressure castings, pump castings, machine tool castings, fly wheels, cylinder heads, sheaves, pulleys, and gears. Another quotation from the paper by McCarroll and McCloud¹ in regard to

Ford Motor Co. also is becoming of increasing importance to the foundryman. This use of copper is typified by the Ford camshaft. The prime requisite for this casting is accurate control of the chilling tendency so as to give a white cam tip and a gray shaft without the use of external chills. This is done by replacing a large percentage of silicon by copper. To quote again from the paper by McCarroll and McCloud, "The use of copper lessens any innate tendency for the swing in either direction (referring to a change in chill depth); in fact, it is quite common for the foundry to operate day after day without additions of either of the alloys ferrochromium or ferrosilicon in the ladle."

To a non-automotive foundry, this characteristic of copper is significant in that it provides a means to iron out and eliminate the variations in chill and Brinell hardness due to the normal fluctuations of the chemical composition during a day's run in the cupola or electric furnace. For example, in chilled sprockets, the use of copper to replace a percentage of the silicon promotes greater uniformity in the chill depth around the circumference of the casting and from one casting to the next. The use of 1.0 per cent copper in this type of casting is normally accompanied by an increase in strength of approximately 20 per cent in addition to an increase in the uniformity of strength in a single heat and from one heat to the next. There are many other similar applications in which the increased uniformity and better control of analysis due to the use of copper can be realized with economy. Fortunately, the low price and the ease of handling copper makes this entirely practical.

Strengtheners

It is not usual to think of a graphitizing alloy such as copper as a strengthener; and in fact, copper itself is not a strengthening agent to the same extent that molybdenum, vanadium, or chromium are. However, due to the characteristics of copper, it is valuable as a strengthening agent in some applications. Copper hardens and strengthens the matrix of cast iron so that even when used solely as a graphitizer or chill reducer, it does increase the strength somewhat. In this respect, copper differs from silicon, which is a more potent graphitizer but tends to reduce the tensile strength rather drastically. Exceptions to this rule include the use of silicon primarily as a "deoxidizer" and its use in low-carbon irons of such an analysis that the strengthening effect of the silicon



A 3.10 per cent carbon, 1.60 per cent silicon cast iron pneumatic cylinder containing 1 per cent copper for the purpose of increasing tensile and transverse strengths, machineability, density, and to decrease section sensitivity. This casting weighs approximately 2800 lb. and has metal sections varying from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. Copper raised the tensile strength from 40,000 to 45,000 lb. per sq. in. by maintaining a transverse strength of 3800 lb., deflection of 0.310 in., and a Brinell hardness of 241. Photo courtesy Bowler Foundry Co., Cleveland.

dent in the diminishing chilling effect on thinner sections adjacent to more massive ones, and a general tightening of the structure in these heavier sections.

"As a definite example, copper aids in making sounder castings around valve ports without too great hardness in the bore sections. If we achieve this by lowering the carbon we would approach a tendency to cracks; to achieve this, on the other hand, by increased silicon is to induce too much

fly wheel castings illustrates the beneficial effect of copper on density. "In a fly wheel, the sections are so great that some element must be introduced to 'close the grain.' As has already been pointed out, copper accomplishes this better than a low silicon content since the copper does it without sacrificing any machineability."

Chill Controller

Another application of the graphitizing effect of copper developed by the



HEAVY duty brake drum made from Grade "A" Meehanite containing over 2 per cent copper for the purpose of increasing Brinell hardness, heat resistance, wear resistance, and machineability. This casting was machineable with a Brinell hardness of approximately 280 and a tensile strength of over 50,000 lb. Photo courtesy of Meehanite Metal Corp.

on the ferrite becomes of importance. Even in these two exceptions, however, silicon has a tendency to induce porosity in the heavier portion of a casting of unequal section.

The strengthening effect of copper can be utilized in many ways. In the first place, the use of copper as an addition to cast iron in percentages sufficiently great, for example, 2, 2.5, or 3 per cent, results in an increase in tensile strength of from 10,000 to 15,000 lb. per sq. in., particularly in low silicon cast iron. Presumably in those percentages, the strengthening effect of copper on the matrix overbalances the weakening effect of the additional graphite formed.

Foundrymen are using copper increasingly in combination with other alloying elements for strengthening purposes. The ability of copper to refine the graphite, increase density, and decrease the section sensitivity, combined with its beneficial effect on machineability and chill, warrants its use in combination with such carbide formers as molybdenum, vanadium, and chromium. In these combinations, copper increases the machineability,

density, and toughness of the cast iron without detracting from the beneficial effects of the carbide forming elements on the physical properties. The use of copper in combination with molybdenum, vanadium, and chromium frequently is responsible for an increase in strength greater than that due to the carbide forming element itself, or from the copper alone. In fact, combinations of alloying elements frequently give different results than might be expected from a summation of the effects of the individual elements. For example, when copper is added to a molybdenum or vanadium cast iron, it apparently becomes a very definite strengthening element in addition to its effect on machineability and density. This is also true to a somewhat less extent when copper is added to chromium cast iron, although in this case, the copper is almost invariably added for its softening and chill reducing effect.

Hardening Alloy

Although copper decreases chill in thin sections and reduces hard spots or excess carbide, it materially increases the Brinell hardness and wear

resistance of the heavier sections of the same casting. In other words, aside from the effect of copper on the breakdown of free carbide or chill, it hardens the pearlitic matrix and therefore promotes greater uniformity of hardness from section to section. The refinement of the graphite and the increase in the uniformity of the structure usually result in an increase in machineability in spite of the higher hardness. This is taken advantage of in such applications as pump castings, machine tool castings, sheaves, pulleys, etc., where an increase in the wear resistance and density is desirable in addition to what might be termed "free machining." A similar application of this same effect is found in the copper-molybdenum or copper-vanadium combinations in which a high hardness and excellent wear resistance are combined with good machineability. Castings of this type are usually machineable with a Brinell hardness of over 300.

Ed. Note—Next week the author will conclude with detailed data on the production, characteristics and uses of typical copper alloy irons and special copper irons. General foundry practice also is described.

MACHINING

Stainless Steel...

By C. W. ALESCH and
G. J. STEVENS

*Metallurgist and Research Machinist
Respectively, Rustless Iron & Steel
Corp., Baltimore*

A VERY timely basic research on the important problem of machining stainless steels is reported on herein. Speed-tool life relationships are given for turning operations, a very effective chip control feature is

described, a grooved drill described has shown a life of 90 holes against 21 holes for a conventional grind, and helpful data are presented for the most efficient threading and reaming of the various stainless alloys.

that they are doing better or worse than the generally accepted standard, and therefore cannot be altogether confident that their costs are in line.

An analysis of problems presented to the laboratories of the Rustless Iron & Steel Corp. revealed that questions about machining bulked large, and were so diverse and scattered as to signify a widespread need for comparative information, as well as fundamental knowledge of a general nature. In attempting to meet this need, a broad laboratory investigation of the machining of stainless steels has been initiated which proposes to evaluate the cutting qualities of each of the common stainless grades in one or more important machining operations, and to discover the important factors in tool set-up that control tool life and work finish.

As the active course of the investigation advanced, it became necessary to recognize that the factors controlling production machining rates are so manifold and complex as to offer little expectation of deriving a complete formula for machining the stain-

A SUBSTANTIAL tonnage of each of the standard grades of stainless steel finds its way into the machine shop for finishing operations on turret or automatic lathes. Much of this steel is intended for products or parts which are produced in large quantities—thus, the machining rate is a very important part of the cost of the finished product, and may be a decisive factor in the choice of the steel or of the source of supply.

An examination of the literature on the machining of stainless steel reveals a deficiency of specific information. Heretofore, each shop faced with a new production machining operation

has had to start with meager precautionary advice from stainless steel suppliers' handbooks, plus its own broad machining experience, and develop by trial and error an operating technique yielding tolerable production and costs.

Naturally, this experimental procedure has brought forth much valuable experience and specific data relating to a number of materials, products and machine operations. However, these scattered data are not generally available, nor are they complete enough to be a reliable guide in estimating or setting up a new job. Neither are machine operators assured



less steels, even after culling the literature and amassing a vast amount of data by laboratory investigation methods and through experience with other steels. This led to the decision that the first purpose of the investigation would be the accumulation of specific, quantitative data relative to production lathe cutting of standard stainless steels. To express it differently, the results were to inform the machinist how to set up for the more common lathe cutting operations, and what tool life and production rate to expect for each grade of stainless steel.

The Turning Test

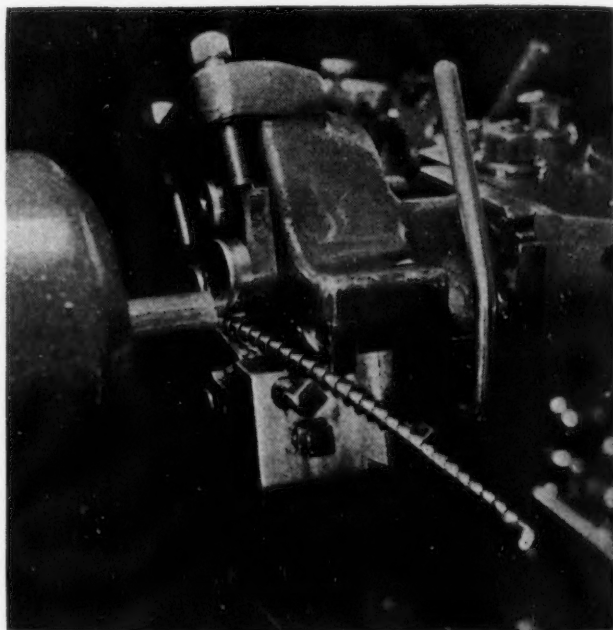
To attack this complex problem in a logical fashion and acquire information of a sound, practical nature, testing of the various stainless steels is done on a production basis. A new, heavy-duty, ram-type turret lathe has been used. (Fig. 1.) This unit was selected to provide flexibility of cutting tool application and also avoid the rigidity of set-up and operating cycles inherent in automatic lathes. The machine tool in Fig. 1 is adapted to heavy duty turning, threading, drilling and forming operations. Ample power is supplied by a 7½ hp. variable speed motor. Special reduction gears are provided for use in the feed train to permit use of fine feeds. Sufficient versatility in the machine tool is thereby assured to permit close approximation of the diverse set-ups used in engine, turret and automatic lathe practices followed in production shops.

The turning operation, the simplest and most obvious, was chosen as the starting point for a systematic approach to an understanding of the machining problems of stainless steels. When this selection was made, it was

ABOVE
FIG. 1—This turret lathe was employed for all the test work.

o o o

AT RIGHT
FIG. 2— Roller-rest, box-type tool holder with continuous chip emerging from the chip control groove.



recognized that turning did not entirely represent the entire field of metal cutting operations. Also, it was not accepted that a single turning operation would represent the entire field of turning conditions.

Since the rigidity of tool and work support is of vital importance, the following summary of points involved in the selection of tool holding and work supporting apparatus is given. A box-type tool holder (Fig. 2), equipped with a roller-type back-rest was selected to provide rigid support of the work piece. The cutting tool is rigidly clamped in position by a heavy cutter-block. The cutter-block and the roller-rest are rigidly held as an integrated unit by the heavy box-tool frame. This unit is amply designed to withstand heavy stresses and the lim-

ited dimensions incorporated provide extra rigidity of support. The cutter-block also holds the cutting tool at appropriate angles to distribute cutting loads to the top and side gibs which support the ram. This holder is a stock item. Its selection did not depart from the policy of holding as closely as possible to production conditions.

Heavy construction and short, rigid design of the box-holder allows only a limited space behind the cutting tool for chip disposal. This difficulty is overcome when deep cuts are made by placing a chip control groove (Fig. 3) in the top face of the cutting tool to produce a continuous chip, which removes all the metal displaced. In the course of investigation, it was discovered that the chip control feature was

closely tied in with the method of grinding the cutting tool. Chip control grooves also are used in production practice in connection with box-holders.

The cutting tools used were made of 18-4-1 high speed steel. This material was selected for initial consideration because of its widespread use and proven merit in production shops. Data relative to this material are summarized in Table I. It is not assumed that carbide and non-ferrous types of cutting tools are not worthy of consideration, but since they are not as widely used as high speed steel, investigation of their cutting characteristics would need be deferred.

The mechanical conditions of the test procedure were arbitrarily chosen from the wide field of turning condi-

TABLE I

Summary of Data on High Speed Steel Cutting Tools

Analyses:	Heat	C	Mn	P	S	Si	W	Cr	V
	A	0.715	0.22	0.020	Trace	0.31	17.68	4.00	1.02
	B	0.720	0.28	0.020	Trace	0.28	17.88	3.97	0.97
	C	0.705	0.26	0.017	Trace	0.26	18.20	4.00	1.03

Heat Treatment:

All the tools were heat treated by preheating to a temperature of 1550 deg. F., quenching in oil from 2340 deg. to 2350 deg. F., and drawing to 1050 deg. F. The tools were held at the drawing temperature for 1½ hr.

Hardness:

All tools had Rockwell "C" hardness numbers of 65 to 67.

tions presented. They were selected to represent shop practice and to establish an initial basis of comparison for the cutting qualities of stainless steels. One-inch round bars were selected for tests since such a size is large enough for heavy turning and easily obtained. The depth of cut was fixed at 0.25 in. This is a heavy cut, but it is not so heavy as to prevent combining roughing and finishing in one cut. Feed was set at 0.0075 in., a fairly coarse feed, requiring considerable power and imposing medium high cutting pressures. The length of cut adopted was 2 5/16 in. This length was selected because it was found that in turning longer pieces considerable quantities of heat were, in some cases, stored in the finished work and might influence the tests to a degree. A viscous commercial mineral oil containing about 50 per cent vegetable oil, 10 per cent animal oil and 8 per cent sulphur was

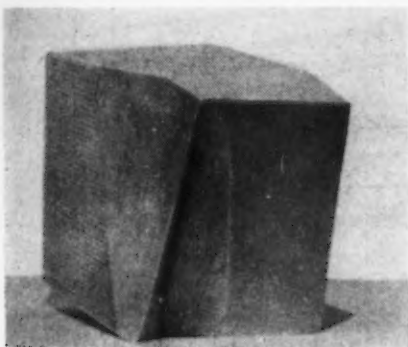


FIG. 3—Cutting tool with chip control groove.

used as a cutting oil. This oil was cut 1:1 with paraffin oil to make the cutting compound. It is realized that this mix probably does not represent the usual shop conditions, but it was selected to provide an initial basis of comparison for studying effects of varying cutting oil mixes. Fig. 4 shows the shape and finish of the completed work piece.

The basic shape of the turning tool

was evolved in several preliminary runs. Each tool is ground on a tool grinder so that each angle and detail can be measured and duplicated. Despite a fairly exhaustive preliminary investigation to evolve the optimum tool, it may be that the precise form chosen is not the single best one, and it is quite possible that a considerably modified form will be developed later for different conditions of feed, speed and depth of cut. The important tool angles and dimensions are listed in Table II and illustrated in Fig. 5.

The method of ascertaining the point at which the cutting tool ceases to cut satisfactorily is based on commercial practice and operator's judgment. When the cutting tool is placed in the tool holder, it is set 0.010 in. in advance of the roller-rest. Cutting is started and continued until the rolls just begin to drag on the shoulder of the test piece. This setting has been adopted as the result of operating and testing experience, which has shown that 0.010 in. wear on the cutting edge is the maximum amount that can be expected with maintenance of satisfactory cutting conditions.

In performance of tests, tool failure invariably originated at the place where the periphery of the work piece and the front clearance side of the tool met. (Fig. 6.) After a certain cutting time elapses, a minute fragment of the cutting tool chips off at the place mentioned. This chipping may take place in two ways. First, the chipping may occur on the front clearance side of the tool land. When this

happens, tool failure follows shortly. Second, chipping may take place on the groove side of the cutting tool land. In this case, the chipping does not materially affect the cutting ability of the tool, and cutting continues until the chipped-out portion is abraded through to the front clearance side of the land. When this type of failure is in progress, there is a possibility that the first type may occur before the second has exerted its full influence. Consequently, all tools were under careful observation and these phenomena were closely watched. All figures given herewith are based on the first type of failure which occurred most rapidly and hence was considered the most severe condition. Observations of the mechanism of tool failure in commercial practice showed it to be identical with that met in testing.

As a result of consultations with several shop supervisors, operators and principals, the standard of tool life at 5 hr. per grind was adopted to represent commercial opinion. It was realized that unless extremely fine variations in speed were used the possibility of obtaining an absolute 5-hr. tool life was remote. Consequently, runs were made at peripheral speeds which produced tool life approximating the 5-hr. figure. In each case, the data were carefully preserved and subjected to analysis to ascertain the proper speed-tool life relation and to maintain a check on the accuracy and control of the tests.

Data accumulated consisted of speed-life relations for a given speed



FIG. 4—Test piece of the type used in turning tests.

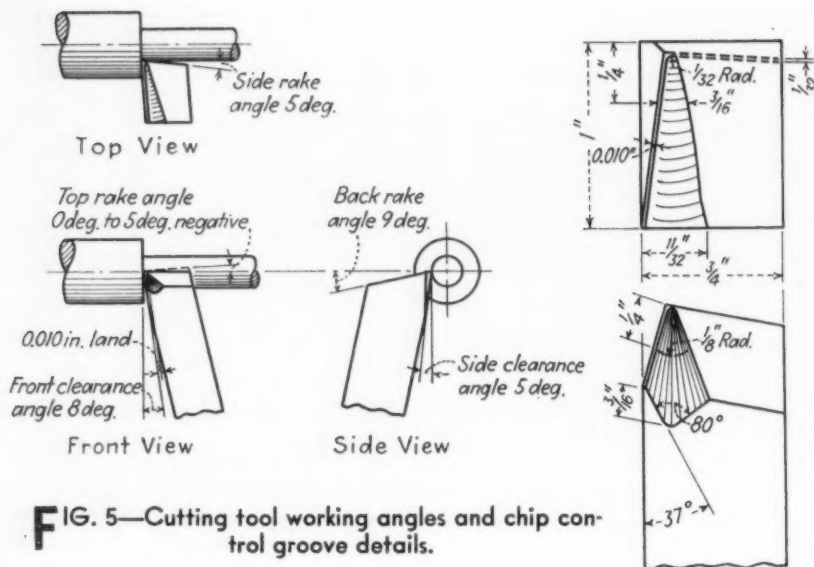


FIG. 5—Cutting tool working angles and chip control groove details.

under the cutting conditions already mentioned. These data were analyzed by plotting tool-life in minutes on abscissae against cutting speed in peripheral surface ft. per min. on ordinates on log-log paper. Since the life-speed relation is expressed as $VT^n = C$, it will have a straight line type curve when expressed in logarithmic form. Consequently, with a sufficient

number of experimentally determined points, the line may be located and deviations therefrom may be readily noted. Data accumulated and analyzed by this method are summarized in Table III and shown graphically in Fig. 7. These data show that the machining quality of a given material is primarily dependent on the analysis. that cold drawing will raise the speed-

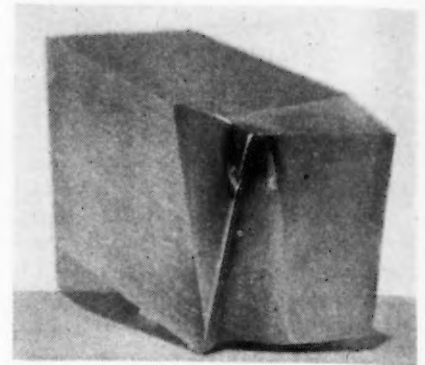
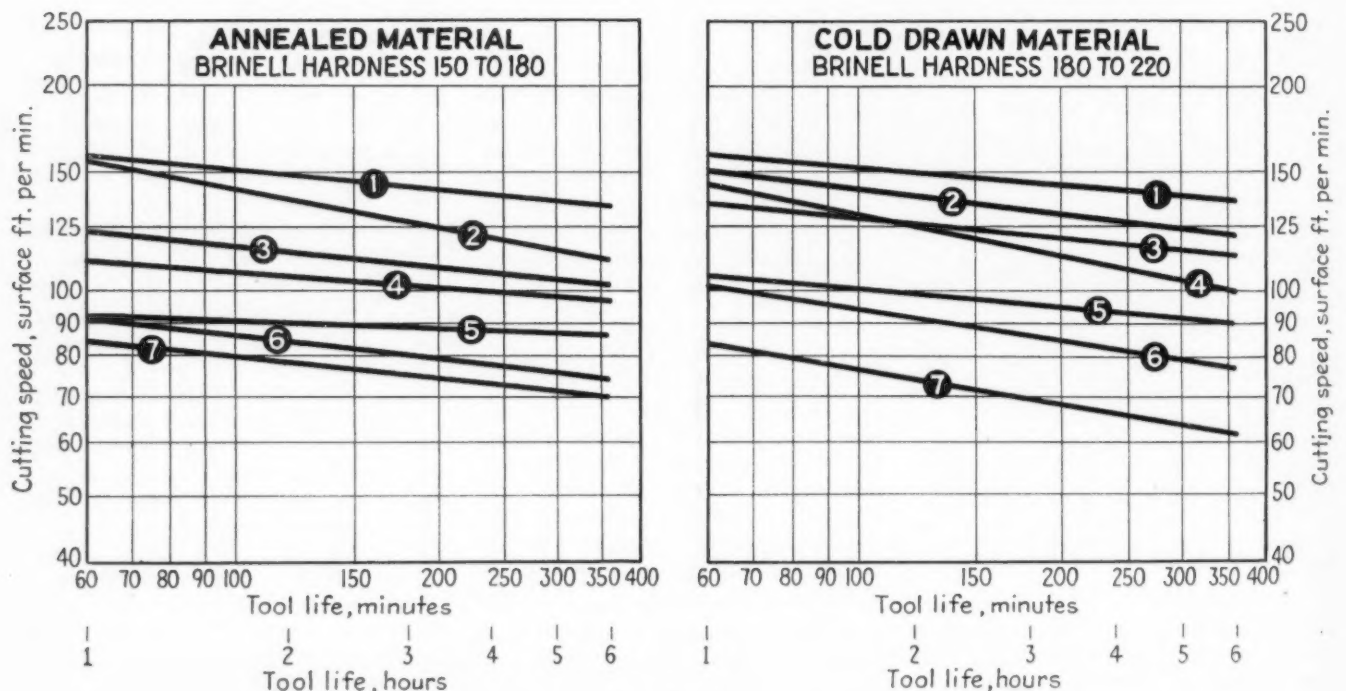


FIG. 6—Ruined cutting tool, showing normal type of failure.

life values of a given analysis over those obtained for annealed material, —with the single exception of the type 440 steel—and that the abrasive qualities of a steel are observable as indicated by the varying slopes of the curves —the steeper slope indicating the more abrasive material as regards its effect on the cutting tool. These curves also indicate proper speed-life relations for tool-life of other than 5 hr. and they are given to cover the range of 1 to 6-hr. tool-life.

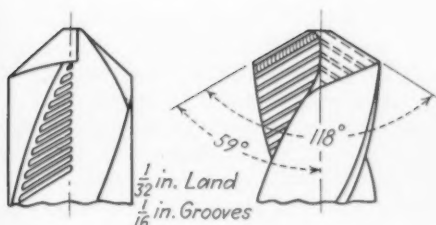
They also show the relative machin-



**ABOVE
FIG. 7**

Relative cutting speeds of stainless steel; 1/4 in. depth of cut, 0.0075 in. feed. Chip curler cutter, box tool holder, sulphur-base cutting oil.

- (1) Type 430F, Rustless 17 free machining grade: C, 0.12 max.; Cr, 14.00 to 18.00; Ni, 1.00 max.; and S, 0.15 min.
- (2) Type 416, Defirust machining grade: C, 0.15 max.; Cr, 12.00 to 14.00; Ni, 0.50 max.; and S, 0.15 min.
- (3) Type 410, Defirust grade: C, 0.15 max.; Cr, 12.00 to 14.00; Ni, 0.50 max.; and S, 0.04 max.
- (4) Type 303, Defistain machining grade: C, 0.20 max.; Cr, 18.00 to 20.00; Ni, 8.00 to 10.00; and S, 0.15 min.
- (5) Type 302, Defistain grade: C, 0.12 max.; Cr, 18.00 to 22.00; Ni, 8.00 to 12.00; and S, 0.40 max.
- (6) Type 420, Rustless 13-HC-35 grade: C, 0.40 max.; Cr, 12.00 to 14.00; Ni, 0.50 max.; and S, 0.40 max.
- (7) Type 440, Rustless 17-HC-90 grade: C, 1.10 max.; Cr, 14.00 to 18.00; Ni, 0.50 max.; and S, 0.40 max.



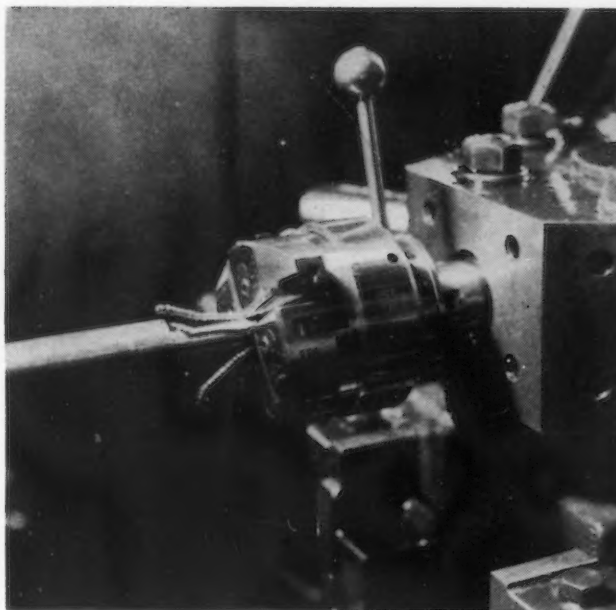
ABOVE

FIG. 8—Chip control groove as applied to drills.

o o o

AT RIGHT

FIG. 9—Tangent type chaser and die head.



ing levels of the standard Rustless grades. In order of cutting speed per given tool life, the Rustless straight chromium stainless irons—type 430F, type 416, and type 410—rank highest in order given while the Rustless chromium-nickel stainless steels—type 303 and type 302—rank next and the Rustless straight chromium stainless steels—type 420 and type 440—stand last in the rankings. In applying these data to grades made by other stainless producers due allowance should be made for variations introduced by the different melting and processing practices involved.

Chip Control Feature

Since the chip curling type tool is efficient in removing considerable volumes of metal at high peripheral speeds while maintaining long tool life and tolerable finish, an explanation of this performance was sought in order that the use of the chip curling feature could be extended. It was observed, in testing that the built-up edge commonly encountered on cutting tools was entirely eliminated. This, it is believed, is due to the fact that the use of the land, inherent to this type of grind, promotes a dragging action in the metal being cut, thus producing an embrittlement of the metal in advance of the cutting edge through cold working. This grind also introduces a steep rake in the immediate region of cutting, which tends to relieve the effects of severely work-hardened and hot chips dragging over the tool face at an angle promoting maximum frictional effects. The groove itself is placed in the tool to force the chip to curl into helical coils, and it is be-

lieved that the contact of the chip and the back portion of the groove promotes a lifting effect on the chip which tends also to relieve excessive frictional effects on the cutting tool.

Drills

This chip curling feature was applied to drills. Two grooves were ground in the flutes of a drill parallel to the cutting edges. (See Fig. 8.)

TABLE II

Summary of Cutting Tool Angles and Dimensions

Tool size	1x3/4x6 in.
Tool holder angles	
Longitudinal	20 deg.
Transverse	15 deg.
Working angles	
Back rake angle	9 deg.
Top rake angle	0 to 5 deg. negative
Front rake angle	5 deg.
Side clearance angle	5 deg.
Front clearance angle	8 deg.
Chip curler angle	17 deg.
Chip curler details—tool angles and dimensions	
Width of land	0.010 in.
Chip curler rake angle	37 deg.
Chip curler groove angle	80 deg.
Width of chip curler groove*	3/16 in.
Radius of chip curler groove*	1/8 in.
Radius of chip curler at plane of emergence	1/32 in.
Trailing edge to point of maximum emergence of chip curling groove	1/32 in.

* Measured 1/4 in. back from tool tip.

The drill was a standard 5/8-in. diameter stock item. Tests were made on 1-in. cold drawn, round, 18-8 free machining stainless steel. The drill was operated at 80 surface ft. per min. peripheral speed and 0.0075 in. feed per revolution. The hole drilled was 1 1/2 in. deep and the drill was not backed out in the course of drilling. Sulphur-base cutting oil was applied by methods common to turret lathes. The grooved drill made 90 holes as against 21 for the conventional grind before the drills failed. Concurrently, drilling time was reduced 25 per cent with the grooved drill. These drills were later checked on a drill-torque machine and the grooved drill showed a much lower torque rating than the standard drill.

Forming Tools

The chip curling feature can also be applied to forming tools. It is particularly effective on the 18-8 types of stainless steel. Forming tools, however, are very often governed by their shape and in certain cases this chip curling grind is impracticable.

Practical Observations

In the course of routine laboratory work many questions relative to forming, threading, tapping and reaming have arisen. It has not been possible up to the present to engage in extensive studies of these phases of the machineability problem. However, as these questions have arisen, tests have been devised to provide a means of settlement. Due to the lack of systematic approach and the broad scope of these problems, it is not possible to

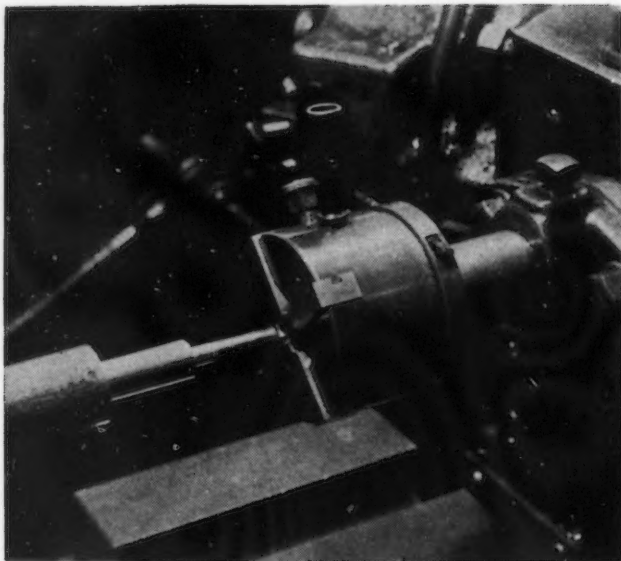


FIG. 10—Hobbed type chaser and die head.

discuss these tests in detail without introducing an infinite quantity of small details. The findings of these tests are summarized and presented here to indicate the type of preliminary work that leads to the adoption of a testing program.

Tool Materials

In general, tools made of high carbon tool steel have been unsatisfactory for cutting stainless steel. High speed steel and cobalt high speed steel have given satisfactory service with stainless. Carbide and certain types of non-ferrous alloys have also given promise, but their adoption should be made only after careful consideration of the operation involved.

Threading

For threading applications, the tangent type chasers (Fig. 9), perform very well, particularly with the larger sizes. These chasers can be ground with steep lip angles which aid in eliminating built-up edge. Lip angles of 20 to 25 deg. have been successfully used on all the stainless grades except the type 430F grade. This latter grade requires lip angles of 5 to 10 deg. Hobbed-type chasers have also proved satisfactory. (Fig. 10.) However, the maximum angle obtainable with safety is 15 deg., which will thread all the stainless grades with the exception of the type 430F which requires a 5 to 10-deg. lip angle. Hobbed chasers have also been valuable in obtaining smooth threads since the chaser follows the contour of the thread. In either case the production of smooth threads demands low threading speeds and sulphur base cutting oils cut 1:1 to 5:1 with paraffin oil according to the

demands of the job. Peripheral speeds of from 20 to 40 surface ft. per min. for the free machining grades and 15 to 25 surface ft. per min. for the other grades have been satisfactorily used in connection with a sulphur-base cutting oil diluted 1:1 with paraffin oil.

When tapping applications have been encountered, high speed steel, ground, and relieved thread taps with a 10 to 15-deg. hook grind have been found to be successful. (See Fig. 11.)

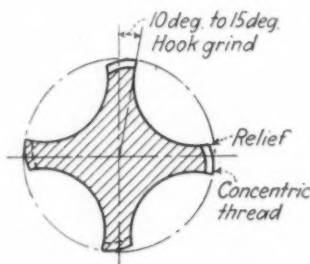


FIG. 11—Relieved thread tap, cross-section.

The relieved thread tap, however, has a tendency to cut slightly larger than a concentric thread tap. Gun taps are best suited for tapping through holes. Since these taps throw the chips ahead of the tool, they are not suited to tapping blind holes. Three or four flute taps have been found satisfactory for tapping blind holes. Two and three flute taps are suggested for use in screw machines on sizes up to $\frac{1}{2}$ in. In cases where a 10 to 15-deg. hook grind on the regular tap fails to perform satisfactorily, interrupted thread taps with an uneven number of flutes have been found to be of help since they require 30 to 50 per cent less

power than the regular taps. It is, in general, inadvisable to tap more than 75 per cent of the full thread. It has been found helpful, particularly on the straight-chrome and free machining types, to use a negative grind on the heel of the tap, to prevent taps from tearing the threads when backing out. It is essential to use an ample quantity of good sulphur-base cutting oil with 1:1 to 5:1 of paraffin oil when tapping. The mixture required depends on the job and the thread quality demanded and, of course, should be determined by experiment. Taps should always be sharp and in alignment with the hole in order to prevent breakage.

Drilling

Drills for general use with stainless grades should have a heavy web and a short spiral with a point included angle of 118 deg., lip clearance of 12 to 15 deg. and a helix angle of 28 to 32 deg. In the case of the chrome-nickel grades, the grooved drill as just described has found successful application. Occasionally, instances are found, particularly in the smaller sizes, where the standard drill will not work satisfactorily. This difficulty has been overcome by the use of the cotter pin type of drill which has a smaller helix angle.

The use of this device allows for increased chip clearance and freedom of movement of the chip through the drill flutes. It has also been found in the case of drills of $\frac{3}{16}$ in. and smaller in diameter that a modification of the clearance angle will help. This modification is made by first grinding the drill to the conventional shape and then regrinding the portion adjacent to the cutting edge to a 6 to 8 deg. clearance. (Fig. 12.) This device utilizes the principle of primary and secondary clearance as applied to milling cutters to obtain strength and lasting qualities at the cutting edges.

In some cases where severe drilling conditions have been met in drilling the chrome-nickel and non-sulphur-

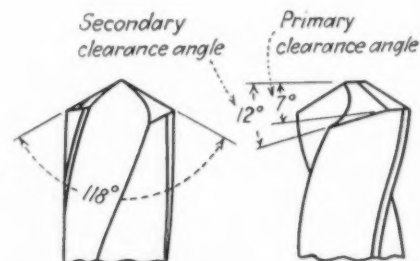


FIG. 12—Modified clearance angle drill.

bearing grades, it has been found advantageous to increase the point included angle from 118 deg. to 130 deg. The use of sulphur base cutting oils is necessary in drilling operations to achieve optimum drill performance. Due to the wide variety of feed, speed and other conditions encountered in general practice, it has not been found advisable to make general recommendations of drilling speeds, but to attempt to devise methods to solve the specific problem at hand.

Reaming

Reaming speeds are also governed by the quality demands of the finished product. It has been found necessary in reaming the chrome-nickel grades to leave ample metal to be removed in order to permit the reamer to "bite" continuously and protect it against rapid wear and failure. It has been found, however, that the free machining grades can be reamed at speeds ranging from 30 to 120 surface ft. per min. while the ordinary grades may be reamed at speeds ranging from 20 to 60 surface ft. per min.

Conclusion

Results obtained from controlled cutting tests have indicated that definite influences are exerted by the com-

TABLE III			
Relative Cutting Speeds for Stainless Steels			
Cutting conditions:			
Depth of cut	.....	1/4 in.	
Feed per revolution	.....	0.0075 in.	
Cutting tool	.....	Chip curler type	
Cutting tool holder	.....	Roller-rest box tool	
Coolant	.....	8 per cent sulphur-base cutting oil cut 1:1 with paraffin oil.	
Type	Grade	Cutting Speeds for 5-Hr. Tool Life	
		Annealed Material	Cold Drawn Material
430F	Rustless 17 FM	137 S.F.M.	137 S.F.M.
416	Defirust machining	116 S.F.M.	123 S.F.M.
410	Defirust	105 S.F.M.	114 S.F.M.
303	Defistain machining	98 S.F.M.	105 S.F.M.
302	Defistain	86 S.F.M.	90 S.F.M.
420	Rustless 13 HC 35	66 S.F.M.	78 S.F.M.
440	Rustless 13 HC 90	72 S.F.M.	65 S.F.M.

position and processing of stainless irons and steels with regard to the cutting-speed tool-life relation. Data obtained have been sufficiently encouraging to justify a further extension of the work to estimate the effects of varying the feed, depth of cut, method of tooling and cutting to arrive at quantitative information that will directly aid the shop man and at the same time aid in establishing a well-

rounded and balanced machineability test. Study of the chip control features has yielded information of practical value in obtaining increased tool life and production rate for certain types of tools, particularly drills. Preliminary studies of tool materials, threading, tapping, reaming, and drilling tools and methods have also yielded information of highly practical and directly applicable nature.

Ryerson Offers H. T. M. Steel

FOR applications where a very high tensile, high hardness, and deep hardening alloy is desired, and where in large sections uniformity of hardness from the surface to the center is sought, the Joseph T. Ryerson & Son Co. has developed a new alloy

called H.T.M. steel. This steel is a chrome-nickel-molybdenum alloy, containing 0.35 to 0.45 carbon, 0.50 min. manganese, 2.0 min. nickel, 0.90 min. chromium and 0.40 min. molybdenum. The alloying elements are said to be so balanced as to permit the develop-

ment of a high hardness with either oil quench or air cooling. Ryerson also claims that H.T.M. is machineable under ordinary shop conditions after being hardened to more than 450 brinell.

Typical physicals on 1-in. round samples are shown in the table.

Air cooled from 1650 deg. F.					
Draw	Tensile Strength	Yield Strength	Elongation in 2 in.	Reduction	Brinell
As quenched	311,000	159,000	0.5	1.85	578
700	241,000	215,000	11.5	37.0	477
900	205,000	184,000	13.5	42.0	415
1100	158,000	137,000	14.0	53.0	321
Oil quenched from 1550 deg. F.					
700	237,000	207,000	11.5	44.0	461
900	205,000	194,000	13.0	44.0	415
1100	158,000	142,000	18.0	58.0	321

Practical ANNEALING

By E. G. de CORIOLIS
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IN this, the second section of a two-part article, the author tells of the annealing accessories now in use for the control of temperature and the preparation and control of atmosphere, and also describes the characteristics of direct, radiation and convection furnaces. Last week, data

were given on the various annealing methods in use, enveloping atmospheres, etc. These data were first presented on Dec. 8 at the symposium on the cold working of metals sponsored by the Metallurgy Department of the Carnegie Institute of Technology.

elements and rises to its set temperature, reducing the supply of heat. The heating elements now radiate their excess heat to the stack, the temperature drops and once more heat is turned on. This goes on until the edge of the sheets has reached the set temperature. The input of heat has by now been considerably decreased, yet the annealing operation is far from completion.

THE next element to be considered in annealing is the control of temperature. The use of temperature control instruments is too well known to require any elaboration, nor is the author concerned with their various types and mechanisms. However, in controlling the thermal treatment of annealing, attention should be directed to the suitability of application to the particular operation being performed.

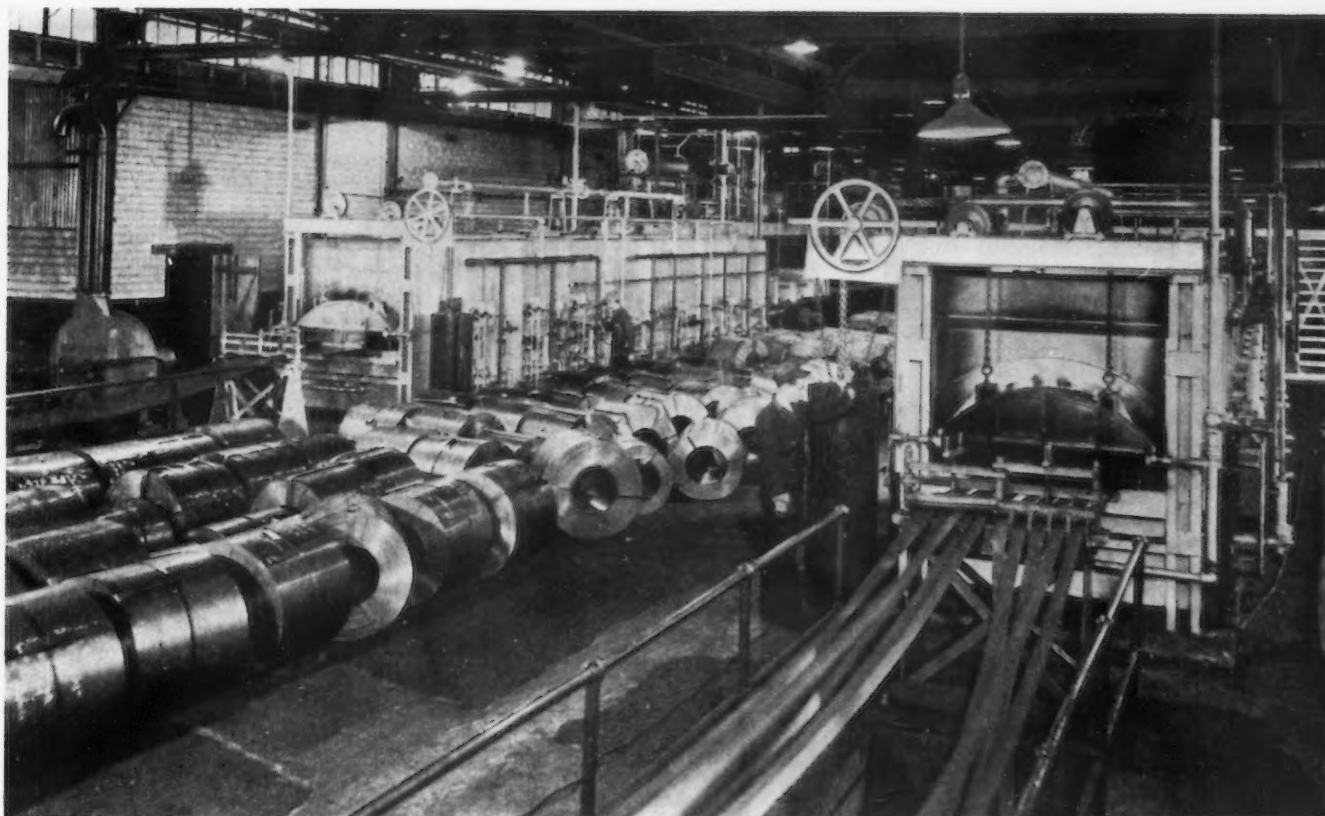
It must be remembered that the instrumentation of temperature control involves affecting a thermocouple bead which necessarily is the focus of heat waves in its immediate vicinity. The temperature indicated is therefore that of a certain restricted area in the laboratory of the heating chamber—it

may have but an indifferent relation to the temperature to which the work itself is being subjected.

For sake of illustration, consider a pile of several tons of sheets being annealed in a box annealer. A thermocouple is placed at a point in the furnace between the heating elements and the stack of sheets. During the first part of the heating cycle, the heating elements will be appreciably hotter than the temperature indicated by the instrument, as the bead of the couple is affected by the low temperature of the adjoining work. When the edge of the stack finally reaches a temperature near but somewhat below that at which the controller is set for, the couple is now more readily affected by the higher temperature of the heating

While the edges of the sheets were coming up to temperature, there was a constant flow of heat by conduction to the center of the pile, this flow being a direct function of the conductivity of the steel and the difference in temperature between edge and center. It is obvious, therefore, that the wider the sheet the longer heat has to travel from the edge in order to equalize the temperature throughout the mass. Hours, therefore, will elapse before such equalization can be reached, and nothing can be done to hasten the operation provided that the heat input and the radiating surface of the element is adequate to the requirements of the mass being annealed. In other words, there can be no thermal head applied without overheating the edges of the pile.

The very opposite of this operation



TWO radiant tube controlled atmosphere furnaces for annealing and normalizing cold rolled strip continuously.

is that of sheet normalizing. Here the process is continuous and the sheets are caused to progress at rapid rate through the furnace by means of a mechanized conveyor. To facilitate the control of the heating elements they are bracketed into zones, each with its own instrument. The control temperature is now set at a point as high as the furnace structure and its mechanism will reasonably stand without regard to the temperature to which the sheets will be heated.

The control of temperature of the sheets themselves will be a function of the speed at which they will travel through the several zones and may in practice be as much as 200 deg. lower than the set furnace temperature. It is well to remember, therefore, that in considering temperature and its control, metallurgists should exercise care to predetermine both metal temperature as well as time cycle, leaving it to the practical annealer to devise the equipment and establish the practice which will produce the result called for without necessary regard to any set temperature of the control instruments. The several factors of the operation will determine what this set temperature should be.

With an understanding of the vari-

ous elements affecting the annealing operation, one purpose of this article should be to translate these in terms of equipment necessary for practical utilization. No attempt will be made to evaluate the merits of various types of equipment now available. As already pointed out, considerable difference of opinion exists as to the equipment best adapted to secure a particular result. Furthermore, it would be impossible to do justice to the subject in the brief span of this article. However, there is ample literature available to those wishing to delve more deeply into it. Yet, this paper would be incomplete without briefly sketching the mechanism by means of which practical annealing may be applied.

Equipment Used

Mention was made last week of the mechanism of annealing in its simplest form—the application of an open flame to a point of stress of a cold worked structure. Next, in order of simplicity, is the open-fired, batch annealing furnace. It might be well to point out at this time that it is not here intended to evaluate the respective merits of the various means available for heating. Solid, liquid and gaseous fuels

as well as electric energy all play a part in the art of practical annealing. Their application and the economics of their utilization have been expounded on numerous occasions. For sake of simplicity and from the fact of their wide distribution and use, attention will be confined to furnaces utilizing the readily available gases—natural and purified coke gas.

A diagram of a furnace directly fired by fuel gas is shown in Fig. 5 in longitudinal and cross-sections. It comprises a metal clad refractory lined structure, usually oblongated, with a refractory hearth supported on spaced refractory piers, and with burners firing between these piers alternately in opposite directions and burners similarly disposed at the arch and firing tangentially thereto. A refractory lined closure is disposed at one end providing entrance for a charge of work. This method of firing provides for rapid circulation of the gases which, by their sweeping action over all surfaces of the refractory lining, tend to impart their heat uniformly to the lining and to the work placed on the hearth.

A thermocouple placed at the center of the furnace and disposed between burners to avoid impingement will in-

dictate within practical limits of accuracy the true temperature of the laboratory or working space of the furnace. When the furnace has reached equilibrium of temperature, by which is meant that the only fuel input required is that necessary to take care of its inherent loss by radiation, the door is opened, a charge of work is placed on the hearth and the door closed. Immediately the furnace temperature drops due to rapid radiation of the refractory lining to the cold charge. If thermostatically controlled, the burners will now come on at full capacity and rapid heating will ensue.

At this point, the practical annealer will regulate the flow of fuel to the burners so as to control the flow of heat to the charge in order to prevent too rapid heating of such parts of the charge as are exposed to direct radiation. Considerable damage due to warpage of cold worked parts may result from too rapid heating. For work of a delicate nature it may even be necessary to charge the cold work into a cold furnace and bring them both up to temperature at a regulated rate.

After the work has been heated to the desired temperature and, if necessary, soaked for a period of time

the work for a period of time at a lower temperature, followed by slow cooling at a pre-determined rate and finally cooling at a faster rate either within or without the furnace. This multi-step process is known as cycle annealing, and is particularly applicable to high carbon and alloy steels. The simpler process of heating, holding and cooling is generally applied to low carbon steels.

The simplicity of this equipment and the ease with which the cycle of treatment may be varied makes it adaptable to a great many annealing operations. It suffers, however, from one serious disadvantage in that articles of steel when so treated become oxidized and have to be pickled before being subjected to further cold working. Some measure of control of surface scaling may be achieved by regulating the character of combustion of the fuel but except in the case of very low temperature stress relieving treatments, the surface oxidation is usually considered undesirable.

Pot Annealing

Where it is desired to protect the surface of the metal during heat treatment, the same kind of furnace may be used but the work is now first

placed within a metal container, commonly called a pot, box or coffin. From this practice is derived the term "pot annealing" or "box annealing." Originally no attempt was made to apply a protective atmosphere to the pot. It was simply luted with clay or its bottom sealed in sand. A first improvement was obtained by packing iron borings at the seal to absorb the oxidizing effect of air being sucked in during the cooling cycle. Later on raw fuel gas was introduced into the pot after it had been removed from the hot furnace and placed on the cooling bed. When equipment was devised for preparing protective atmospheres from fuel gases these prepared gases were substituted for raw fuel gas during the cooling cycle. Finally the practice was still further improved by providing means for introducing the prepared gases into the pot during the heating cycle and maintaining the flow of this atmosphere uninterruptedly until the work was finally cooled to room temperature and ready for removal from the container.

The batch annealer has been built in many forms, such as the large coffin annealer formerly so universally used in sheet mills, the vertical cylindrical furnace frequently used in wire mills, and the car-bottom furnace still in use in many fabricating industries. The principles involved, however, remained fundamentally the same, the use of these various types being selected for ease of handling large charges of work and predicated upon the class of work and the mechanisms best suited to each class.

Annealing Bell

More recently the batch annealer has undergone a more radical change in that both furnace and work were made movable. Reference is made to the annealing bell or annealing cover now

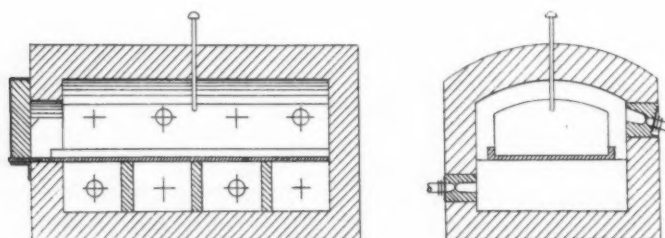


FIG. 5—This open-fired, batch annealing furnace is fired with fuel gas. A thermocouple is placed at the center of the furnace and disposed between burners to avoid impingement.

thereafter in order to secure the necessary metallurgy, the work may be removed hot from the furnace and allowed to cool in the open air, or the burners may be turned completely off and both work and furnace be allowed to cool slowly to such temperature as may be necessary to prevent too rapid chilling when the work is moved out into the open.

An additional step may be introduced wherein the work is first heated to a higher temperature, allowed to soak at such temperature, the burners turned off to allow the work to cool partially, then again turned on to hold

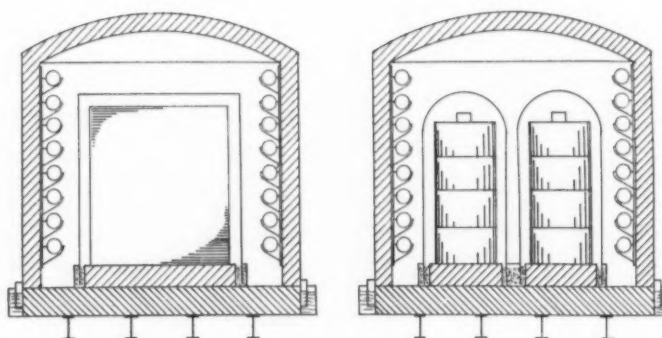


FIG. 6—An annealing bell or annealing cover of this type is coming into practically general use in the sheet, strip and wire industries.

coming into practically general use in the sheet, strip and wire industries. This annealer is illustrated in Fig. 6. It shows a refractory lined base suitably supported on structural steel. In the case of sheet steel it is stacked in a pile on this base and in the case of strip the coils are placed on individual bases containing a circulating fan. A tightly welded sheet metal cover is placed over the work, the open end being sealed at the base. A refractory, metal clad housing is now lowered into place to rest on the refractory base with the edge sealed. Heating elements are disposed along the walls of this housing.

Means are provided for introducing a protective atmosphere within the space confined by the inner metal

If, however, higher temperatures and shorter cycles are desired, as in the case of normalizing, equipment of quite different type must be used. Fig. 7 shows the type of normalizer which was in current use in sheet plants when rolling was done in hand mills. This type of furnace is still in use for heat treating special types of steel. It consists of an elongated heating furnace followed by a shorter refractory lined zone and provided with rotating shafts or disks, upon which individual sheets progress either singly or in packs of two with an alloy waster sheet to keep the disks from marring the supported surface of the sheet. The cycle is quite rapid.

These furnaces are usually heated to temperatures in excess of that at-

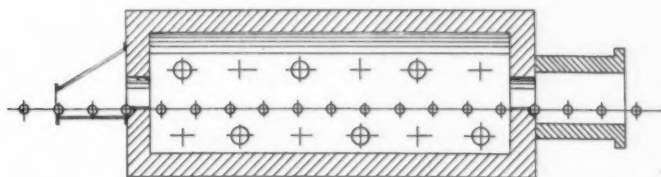


FIG. 7—This type of normalizer was in current use in sheet plants when rolling was done in hand mills. It is still used for heat treating special types of steel.

cover. This displaces the entrapped air and also drives out the vapors of lubricants left on the work during the previous cold working operations. Special tubular exits may be provided for this purging operation or the gases may be allowed to seep out through the seal into the space between the cover and the bell, and finally through the outer seal. When the heating up and soaking periods are completed, the hot bell is lifted by a crane and lowered over another freshly loaded base and the operation repeated. The heated charge is allowed to cool slowly within the inner metal cover and still surrounded by a supply of protective atmosphere until sufficiently cold to be uncovered and handled. By this method a single heating bell may be made to serve a number of annealing bases.

As previously set forth, batch annealers of the type just described necessarily involve prolonged heating and cooling cycles due to the large masses of metal being heated simultaneously. These long cycles reflect themselves in the grain structure of the annealed metal and do not lend themselves to much variation in time or temperature. Only such metal as will respond to these long heat treatments can be annealed by this method.

tained by the steel itself. The requirement is to heat as rapidly as possible to a top temperature as high as 1850 deg. F., with a few seconds hold, followed by rapid drop to below the lower critical, and final cooling in air. No protective atmospheres are provided except, through control of combustion of the fuel, a so-called "rich" atmosphere is maintained. The time in the furnace is so short that only a light oxide film is formed which is readily pickled off.

Strip Annealer

A modified form of normalizer, known as a strip annealer, has been used for continuous annealing of cold rolled strip steel. In this equipment the steel is protected from oxidization by making the furnace casing gas tight and substituting radiant elements for the open burners of the sheet normalizer. The cooling zone is provided with water jackets and is considerably longer than the heating zone, as the steel temperature must be lowered to close to room temperature. The ends of the furnace are tightly sealed except for a thin aperture to allow the strip to pass through. A protective atmosphere is maintained through all zones. The strip is uncoiled at the charging end, is supported by rollers spaced at

intervals throughout the furnace length, and is recoiled at the discharge end. Stitching equipment is provided at the charge and shearing equipment at the discharge end, so as to obviate interruption in the flow of the metal through the annealer.

Furnaces in use in fabricating plants are many and varied in their mechanisms due to the wide variety in the shape and character of the work to be annealed. Usually cycles are short, and wherever production justifies it the continuous furnace is in general use. The most favored mechanisms are the tray pusher, the woven wire belt, the cast alloy belt, the roller hearth and the walking beam. These furnaces were formerly direct-fired, but more recently the controlled atmosphere furnace has taken its place, the object, of course, being to preserve the metal surface and to eliminate the pickling which is not only costly but highly objectionable in line production plants. The furnaces themselves are equipped either with metallic muffles externally fired or with radiant elements.

Some annealing is done in baths, such as molten lead or molten salts but such practice is restricted to specialties. Where the product is in elongated form, such as strip or wire, continuous strand furnaces are used. For certain treatments requiring rapid heating and cooling, such as wire patenting, the strand furnace is a necessity.

Summarizing, it might be said that the problems involved in practical annealing are largely factors of the mechanisms of handling, heating and cooling. With the rapidly increasing use of controlled atmosphere furnaces these problems have been multiplied several fold. They involve the questions of selection of most suitable atmospheres, types of mechanisms most readily adaptable to handling a particular class of work, suitability of the furnace and its method of heating, control of the protective atmosphere and its rate of flow with respect to air intrusion into the furnace, explosion hazards that may be incurred and safety devices to prevent their occurrence, suitability of heat control equipment, labor costs and overall costs of the total operation, and necessarily the suitability of the equipment as a whole in interpreting a correct metallurgical practice. It is obvious that a satisfactory result cannot be achieved without a thorough understanding and co-operative viewpoint between the metallurgist, the practical annealer and the equipment designer.

THE so-called acid refractories, for the most part made from alumina and silica, find major use in the steel industry. The nature of these refractories, methods of manufacture and physical and thermal properties are all considered in detail in this article. Last week, the author considered the alumina-silica diagram and its significance, fire clay refractories, semi-silica bricks, etc. Herein, in the second and last section of this report, attention is directed to methods of manufacture of commercial refractories; properties of silica brick, and aluminous refractories; and the nature of refractory tests.

THE manufacturing processes used for refractory materials depend to a large extent upon the characteristics of these raw materials, such as plasticity, shrinkage, etc. Silica brick, for instance, consists mainly of granular silica bonded with a very small amount of lime. Cohesion during forming is obtained with water. Inasmuch as none of the constituents develop any plasticity, the product cannot be obtained by a plastic process but must be formed by pressing in steel dies or similar methods.

Refractory clays such as kaolin, notably Georgia kaolin, and many of the silicious types of clays from which a number of European refractories are made, undergo high shrinkage during firing. To insure economic operation and to maintain low firing losses, they must therefore be fired or calcined, and then crushed and rebonded with small amounts of the same material, which is more or less plastic. In the handling of coal measure clays, to obtain various types of products, it is necessary to resort to a number of processes for certain practical reasons. For example, it would be impractical from a cost standpoint to produce limited quantities of special shapes, by dry pressing in expensive steel dies. Most of these shapes, therefore, are made in wooden molds

*For a comprehensive description of analyses, tests, definitions, specifications and classifications of refractories, the "Manual of A.S.T.M. Standards on Refractory Materials," prepared by Committee C-8, will be of interest.

by the hand-made process, of which several modifications are in use.

In one of these, plastic clay from a pug mill or an auger machine is thrown by hand with considerable force into a mold, usually made of wood. The excess clay is cut off with a wire, and the surface smoothed with a spatula or a similar tool. Fig. 9 shows one part of this operation. Or, the mixture may be tempered with a small amount of water and rammed into the mold with a tool. In a third modification a large portion of the material is calcined, the batch containing

only a small amount of clay, and again the material is rammed into a mold with a tool. Dry or power pressing is resorted to where quantity production is possible, for forming standard shapes such as 9-in. straights, soaps, wedges, etc.

The granular materials which are prepared for this process are mixed with 8 to 10 per cent of water. This amount of water is necessarily very accurately controlled. The materials contain considerable air on the surface and in the interstices between the grains. When the relatively dry materials are pressed this air is likewise compressed. As the pressure is released expansion takes place, resulting in fracture of the product. To avoid this, vacuum pressing has been de-

Alumina and Silica

TABLE V
Analyses of Calcined Bauxites and Diaspores

	(Per Cent)					
	Alabama Bauxite	Alabama Bauxite	No. 1 Missouri Diaspore		No. 2 Missouri Diaspore	
SiO ₂	21.49	6.85	12.31	9.03	22.11	15.43
Al ₂ O ₃	73.70	87.50	80.51	84.19	70.98	77.28
Fe ₂ O ₃	1.18	2.70	1.55	1.35	1.26	0.98
TiO ₂	3.20	3.10	3.80	4.20	3.46	3.22
CaO	0.11	0.34	0.22	0.18	0.10	0.13
MgO	trace		0.23	0.11	0.20	0.40
Alkalies	0.36	trace	1.39	0.84	1.99	1.65

TABLE VI
Thermal Characteristics of Fire Clay Refractories

Class	Cone Deformation, P.C.E.	Spalling
Super duty refractories	Above cone 33, (3173 deg. F.)	Less than 4 per cent loss on standard spalling test
High heat duty	Above cone 31, (3056 deg. F.)	
Silicious fire clay	Above cone 29, (2984 deg. F.)	Must take 25 lb. per sq. in. at 2460 deg. F. with less than 4 per cent shrinkage and less than 1 per cent expansion
Intermediate heat duty	Above cone 28, (2939 deg. F.)	
Moderate heat duty	Above cone 26, (2903 deg. F.)	
Low heat duty	Above cone 19, (2768 deg. F.)	

The author gratefully acknowledges the assistance of Harbison-Walker Refractories Co., General Refractories Co., the North American Refractories Co., and the A. P. Green Fire Brick Co., who supplied some of the graphs, tables, and photographs used in the articles.

REFRACTORIES

By HOBART M. KRANER
Ceramic Engineer, Bethlehem Steel Co.

veloped, the result of which is shown in Fig. 10. This procedure not only lowers the losses for the manufacturer, it gives a less porous product of higher density, a product which has wider use.

Steam pressing and vacuum pressing refer particularly to a repressed product produced from a partially dried semi-elastic blank previously formed in an extruding operation of materials prepared in plastic form. A special type of auger machine is used in the extrusion process. See Fig 11. Vacuum may be applied for removal of air trapped in the plastic mass, thus bringing all of the particles into close contact. As the material is extruded from the auger it is cut by wires to approximate size and shape. These blanks are partly dried on a steam heated or air-blown floor, until ready for repressing.

Repressing can be done by hand, but power methods are now in more general use. Due to the nature of this processing, the materials are compacted firmly, hence a very dense product is obtained. However, it is necessary to use a certain amount of plastic clay in this process which, as previously stated, contains alkalis and other fluxes which develop liquid phases at low temperatures and which thus produce early coalescence, 0.5 to 20 per cent plastic clay being the smallest amount that can be used. Extruded or steam pressed refractories are, therefore, influenced to some extent by the amount of plasticity required to make extrusion possible. Flow sheets of the several modern processes of production are shown in Fig. 12.

Silica Brick

The reason for the plasticity of clay brick over a wide range of temperatures has been explained, also the characteristics of "Jersey Clay" or "semi-silica" brick. Silica brick consists almost entirely of pure silica minerals with a definite, sharp melting point. The raw material is quartz

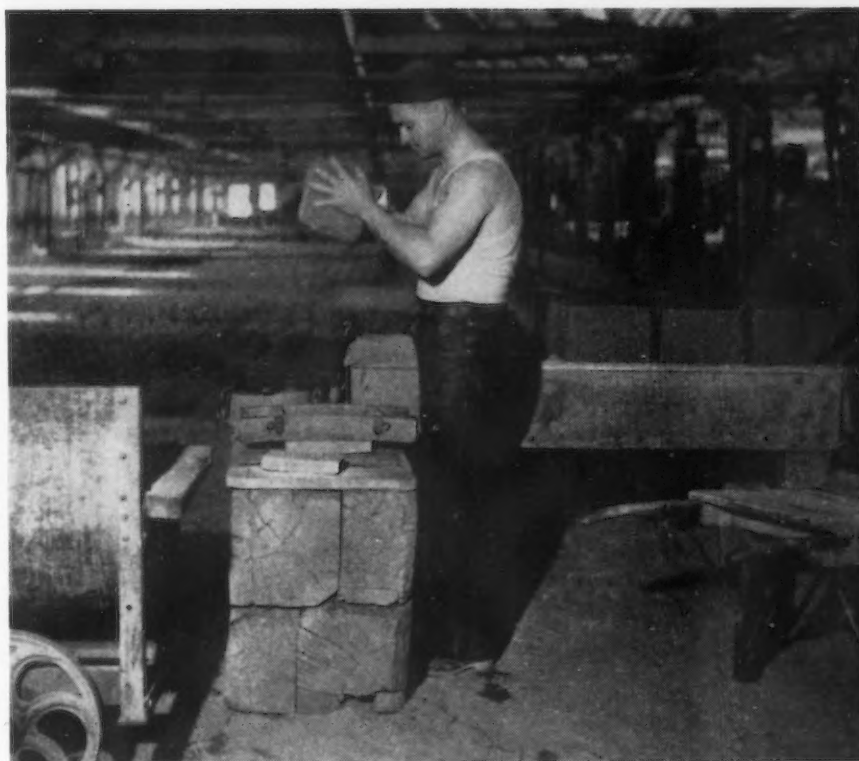


FIG. 9—Molding tile by hand with plastic mix. The molder has rolled the "wauk" to obtain the proper form and is lifting it to throw the clay into the mold to form the tile. Note the wauks of clay on the table ready to be rolled and formed into tile.

bonded with lime. During firing the quartz changes suddenly to the beta phase at 1070 deg. F. This transformation is reversible and is accompanied by a large change in volume which would be detrimental to a furnace structure if the low temperature phase of quartz were not in turn transformed to tridymite or cristobalite. Tridymite and cristobalite are not reconverted to quartz and are, therefore, not subject to sudden serious volume change like quartz by hard firing in kilns. They are more refractory than quartz, and this may explain what the open hearth melter means by "seasoning the roof," for it is well known that a "seasoned roof" has a well developed face of the more refractory silica mineral cristobalite exposed to the furnace atmosphere. Reflective surface, on the other hand, is not evidence of longer life in a "seasoned" roof, as such a reflective

face is also obtained by the melting of a short life roof.

Most refractory materials have their fusion temperatures progressively lowered by additions of fluxing materials. This is not always the case with silica, as additions of iron oxide or lime, up to about 35 per cent, do not so affect its fusion temperature. (See Figs. 13 and 14.) Small additions of alumina and alkalis, on the other hand, do affect the fusion temperature and are, therefore, detrimental to the properties of silica bricks, causing them to lose their most valuable characteristic, the load bearing ability. (See Fig. 15.) As will be noted, 2 per cent Al_2O_3 is the upper limit of high load-bearing silica bricks.

Aluminous Refractories

Diaspore and bauxite are less plentiful but they are rich in alumina and have a higher fusion temperature than ordinary fire clays, as will be

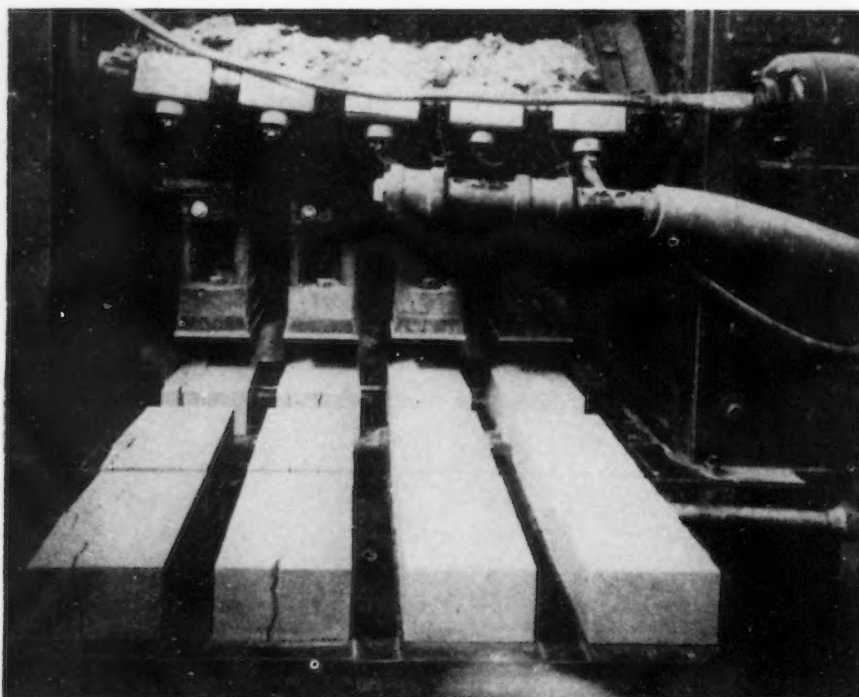


FIG. 10—Dry pressing. Note the effect of pressing with vacuum at the right, as compared with cracked product at left.

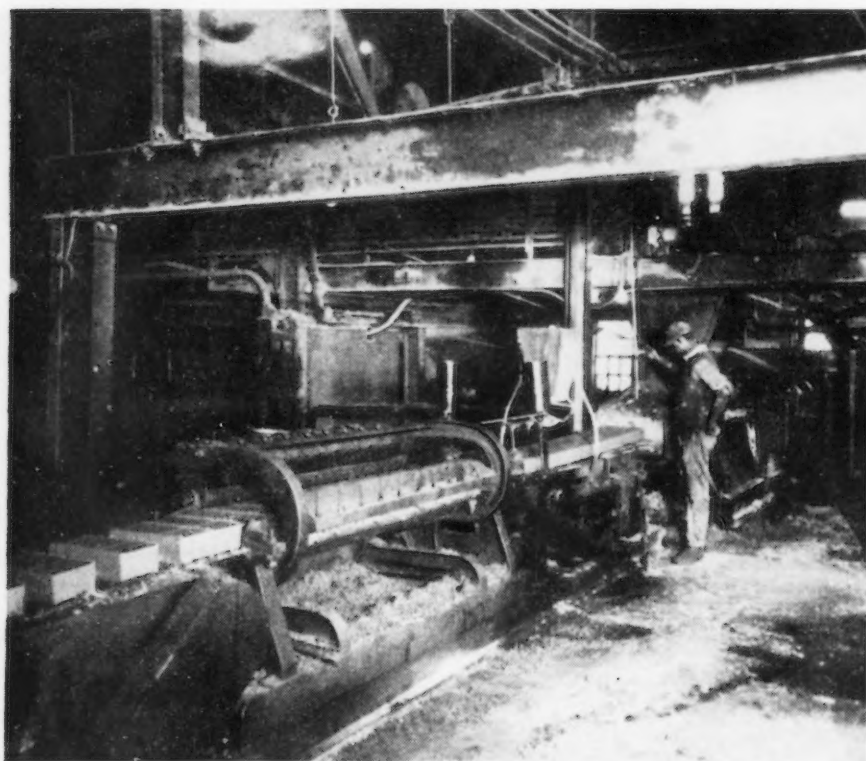


FIG. 11—Extruding and cutting blanks for stiff mud (steam press) bricks. These blanks will be dried slightly and then repressed.

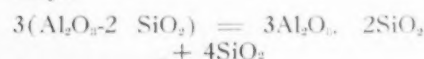
seen from the alumina-silica diagram. They can be used to good advantage in raising the fusion temperature of fire clay mixtures. Thus, there is a wide range of commercially available aluminous refractories representing

various combinations of fire clay and such aluminous minerals. Most diaspores and bauxites contain appreciable amounts of iron oxide and titania, while the alkali content of bauxite is notably low. (See Table V.)

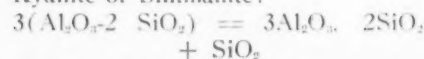
These aluminous products are generally processed in much the same way as ordinary clay mixtures. Their greater refractoriness, however, presumes a use at higher temperatures and necessitates harder firing to reduce porosity and to produce the same degree of density, strength, and coalescence as is obtained at lower temperatures in bricks of lower refractoriness. Since this is an expensive operation, aluminous refractories which shrink during use are frequently received.

Andalusite, kyanite and sillimanite all have the same formula ($\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$) and are used to some extent in alumina-silica refractories. They are natural minerals but they are not stable at furnace temperatures during manufacture or use. Mullite ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$), as stated previously, is the only existing artificial mineral of alumina and silica. Upon firing, clays, sillimanite or kyanite are all transformed into mullite and a silicious glass, the latter in proportion to the excess silica remaining, as follows:

Clay:



Kyanite or Sillimanite:

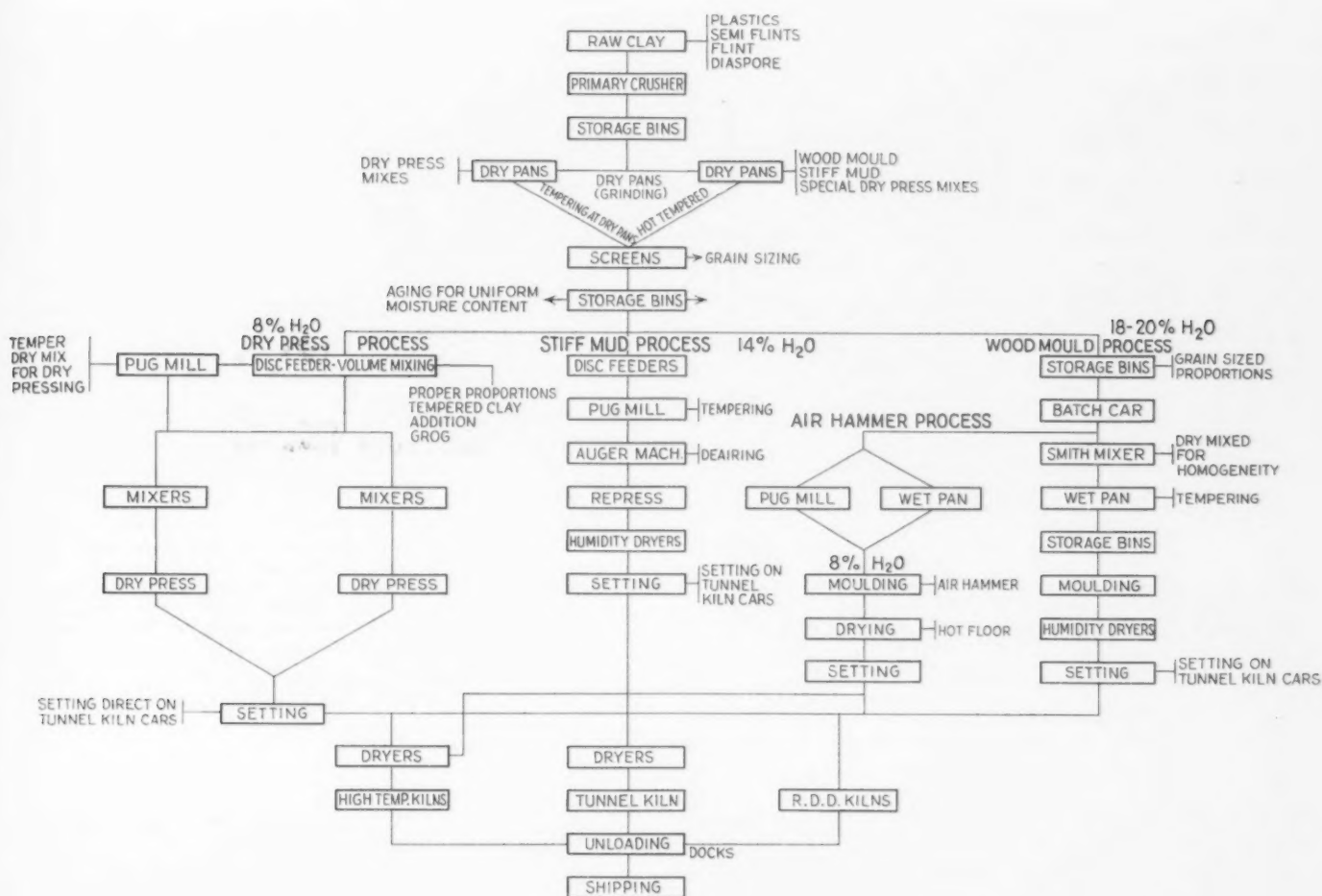


It may be seen from the formulas that the product formed from sillimanite and kyanite contains less excess silica than does clay. The impurities segregate with the silica to form glassy phases of low melting temperatures and the amount of these, therefore, determines many of the physical properties.

Unlike kyanite and sillimanite, andalusite has approximately the same specific gravity after conversion as prior to firing. Kyanite and sillimanite expand on firing. Calcination is quite necessary if their use is to be successful.

The "view from below" inversions, shrinkages, "volume changes" and "porosity" all imply a state of unattained equilibrium due to an unfinished process or to a lack of homogeneity. This unattained equilibrium is likely to be found in compositions which are highly refractory and therefore expensive and difficult to fire to a high degree.

Porosity is a detriment to a refractory which is required to withstand slag as it permits attack over a "wider front" than would be the case were the surface impermeable. The electric fusion and casting of aluminous refractories which would otherwise be



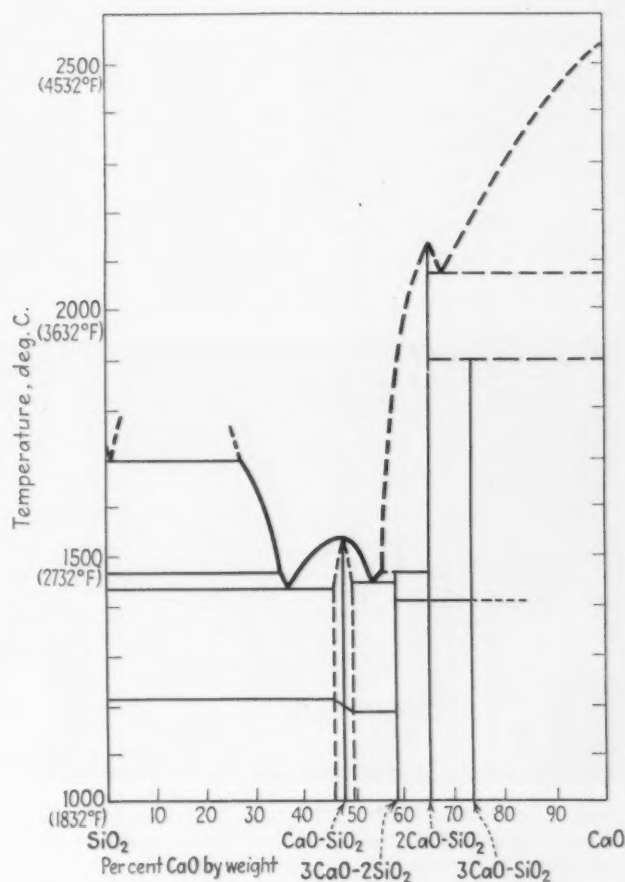
quite porous gives a product which is dense, impermeable, and volume stable as a result of having been melted and thus brought to equilibrium. Such dense products are rigid and relatively brittle and since they do not withstand heat shock, they cannot be expected to be used in many applications of the steel industry. The economics of the production dictates that this type of material be produced in large blocks whereby the per ton mold cost is low. Although particularly sensitive to thermal shocks, a high-density fused refractory has great chemical resistance at high temperatures and is therefore particularly desirable for this type of service.

A refractory which has been melted and cast has a microstructure entirely different from that of a refractory which has been fired only. This is illustrated by Figs. 16 and 17, which show the microstructures of two refractories of almost identical chemical composition. The mineral structure of the fired refractory shows the effect of a heat treatment which is only moderate compared with the ultimate fusion temperature of the mixture.

In the case of the fused refractory,

FIG. 12—Flow sheet of fire clay brick, all processes. Stiff mud is also referred to as extruded-repressed; and wood mold process also termed hand made.

FIG. 13—The lime-silicon equilibrium diagram (Geophysical Laboratory, Washington, D. C.), showing no appreciable lowering of the fusion temperature of silica until almost 30 per cent of lime is present. The lime used to bond silica bricks does not therefore affect its fusion temperature (see J. W. Grieg, "Immiscibility in Silica Melts" American Journal of Science, Vol. XIII, 1927, p. 18).



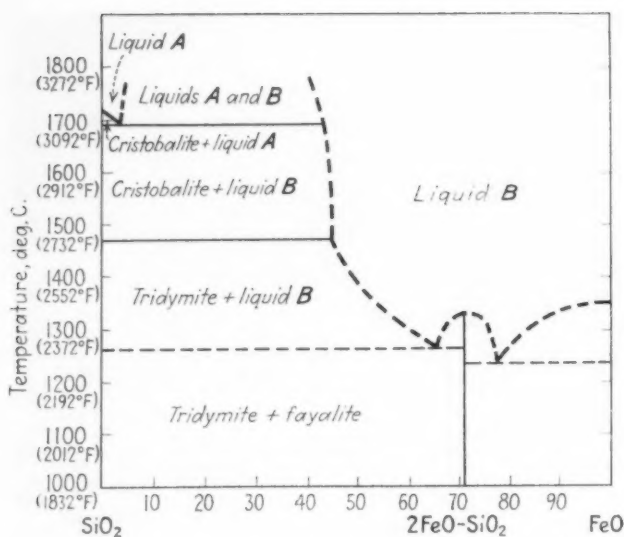


FIG. 14—Equilibrium diagram, FeO-SiO₂ system. Note no lowering in the fusion temperature of silica until more than 40 per cent of FeO is available (Bowen and Schairer, *American Journal of Science*, Vol. 24, 1932).

on the other hand, the materials have been brought to the liquid state. Here is found complete crystallization, with large crystals separated from the liquid phase. The portion of this material which does not crystallize readily is present as a glass, filling the interstices between the large crystals of mullite and corundum. At the present time this method of manufacture is limited in its practical application. This is largely due to the fact that many ceramic compositions are too viscous at their melting temperature to be poured and many have annealing characteristics which do not lend themselves to economical recovery of sound blocks.

Refractory Tests*

Refractory tests have been designed to reveal the inherent properties of the material from which the product is made, and the properties contributed by the method and extent of processing. Simple fusion tests are used to determine the refractoriness or resistance to heat; porosity, or bulk density indicates the extent to which the product has been grain sized, the degree to which it has been pressed, or fired. All of these tend to reduce porosity and therefore increase the bulk density. True specific gravity is especially valuable in determining the degree of fire of silica brick as the conversion of the

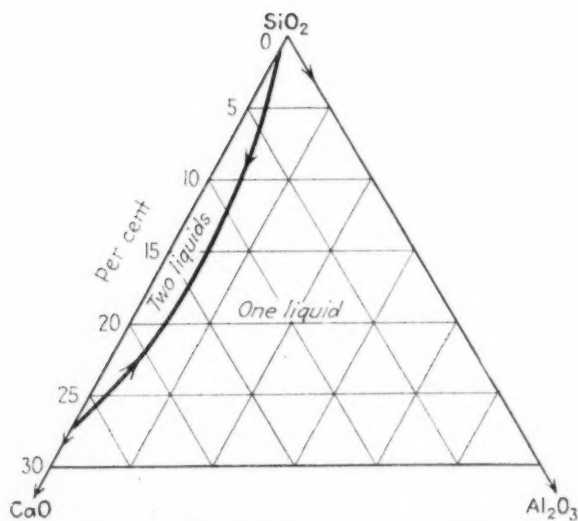


FIG. 15—Portion of the lime-alumina-silica equilibrium diagram showing the effect of alumina upon the "two liquid" field. This establishes the upper limit of allowable alumina in silica bricks. Alumina rapidly lowers the fusion temperature and softening range beyond this limit (from Rankin Wright, *American Journal of Science*, Vol. 39, 1915, pp. 1-79; see also J. W. Grieg, "Immiscibility in Silica Melts", Vol. XIII, Feb., 1927, p. 37).

original quartz to other more stable forms of silica is dependent upon the degree of fire. These more stable forms of silica have lower specific gravities than quartz.

The consumer is interested in knowing how well the refractory will—

- (A) Resist heat alone, with or without load.
- (B) Resist heat and slag from a purely chemical standpoint.
- (C) Resist penetration of slag.
- (D) Resist thermal change.

The ceramic engineer has developed for his own use tests which in large measure are indicative of these properties, although to him they indicate primarily to what degree he has proc-

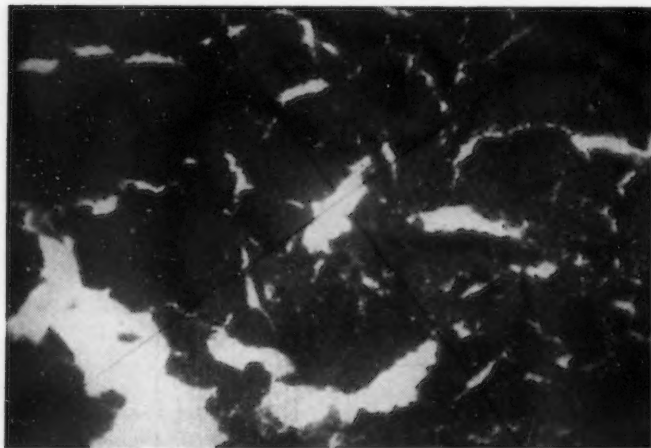


FIG. 16—Photomicrograph of 70 per cent alumina fire brick made from diaspor. Dark areas are masses of tiny crystals, too fine to be visible at this magnification (400 diameters). The low fusing constituents are incorporated in the mass of these tiny crystals.



FIG. 17—Photomicrograph of a fused refractory, 70 per cent Al₂O₃, showing coarse crystals of mullite (gray) and segregated areas of low fusing constituents. At 400 diameters.

essed his raw material. The pyrometric cone fusion test is a comparison of the fusion temperature of an unknown with other ceramic mixtures with known fusion temperatures and is a rough measure of the ability of the refractory to resist heat.

The load bearing characteristics at elevated temperatures, however, give a better idea of refractory character when supplementing the fusion temperature. They show clearly the development of liquid lubricating phases within the mass as a result of heat alone.

Fusion temperatures are generally determined by comparing the fusion temperature of a small triangular cone of the product with a similar sized standard cone whose fusion temperature is known. The resulting equivalent is recorded as the PCE (pyrometric cone equivalent). The temperature sometimes reported with the cone is only approximate. Most refractories soften over a wide range of temperature and therefore a fusion point represented by a precise temperature is not a proper indication of value. (See Fig. 18.)

The load test is conducted in a furnace with a constant load of 25 lb. per sq. in. carried by the brick while the furnace temperature is being raised, or is held at a certain figure. The deformation obtained and the temperature of failure are indicative of load bearing ability as well as the rate of development of the lubricating liquid phases.

Porosity is determined by water absorption and the volume of water absorbed is referred to the volume of the specimen. It is another simple criterion of refractoriness, although a knowledge of the pyrometric cone fusion temperature along with the porosity is necessary in the proper interpretation and full significance of the porosity figure. For instance, an easily fusible ladle brick having a porosity of only 13 per cent may have been fired to cone 3 (approximately 2100 deg. F.), whereas a super duty clay brick having the same porosity is necessarily fired to 2700 deg. F. to attain this low porosity. Porosity is to some extent influenced by the gradation of sizes of the granular constituents, although there is a certain limitation to the extent of this influence of grading upon fired porosity.

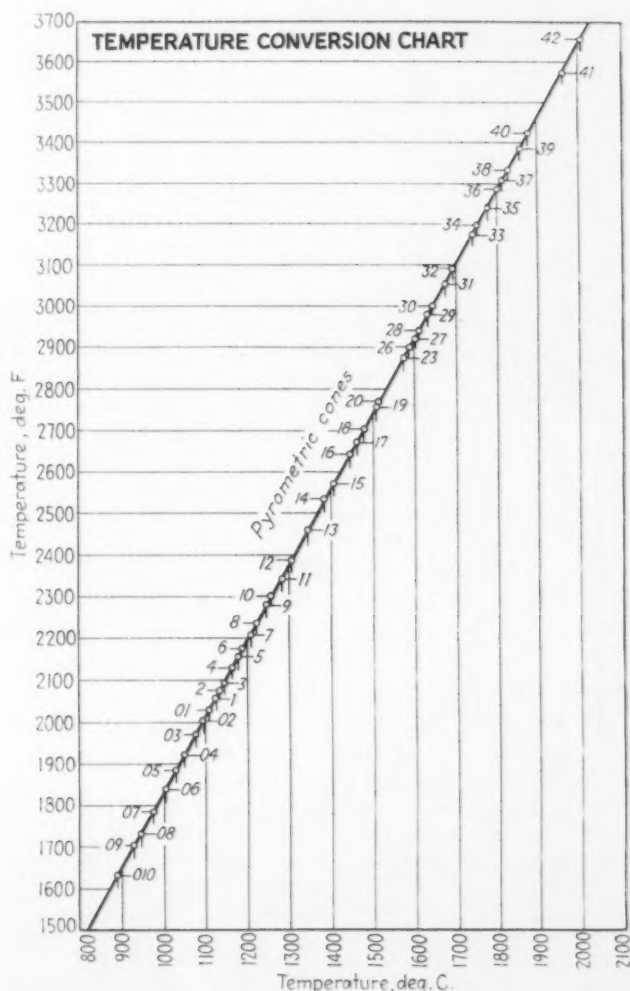
The reheat test is used to determine the effect of refring or use upon volume stability. It further indicates the extent to which the refractory had been fired. Firing (or using) a refractory at a temperature lower than

that at which it had been originally fired causes no change in its volume or shape. If a refractory shows a shrinkage in the reheat test this is due to coalescence. If it expands this is due to bloating, overfiring, or characteristic mineral changes as in the case of silica bricks.

Cross-bending and compression tests are occasionally used. Tensile tests on all ceramic materials are difficult to

termine the resistance of a brick to thermal shock. The standard test consists of subjecting a test panel of 14 standard bricks alternately to the temperature of a furnace maintained at 1400 deg. C. (2552 deg. F.), for 10 min. and to cooling in an air-water mist for 10 min. Such 20-min. cycles are repeated 12 times. The 9x2½-in. face is exposed to this treatment. If bricks spall under this treatment the

FIG. 18—Fusion temperature relations of standard pyrometric cones used in testing and firing ceramic products. (Chart designed and arranged by Dr. G. E. Seil, of E. J. Lavino & Co.)



make and are impracticable due both to the difficulties in preparing the test pieces, and inability to apply load uniformly to such a brittle material. Wide variations in values are generally obtained. This may be largely due to the brittleness of such materials. The cross-bending test is a convenient substitute which can be used on standard shapes such as firebricks. While the result reported as modulus of rupture is not known to bear a direct relation to tensile strength it may be regarded as a rough gage of this property. Ceramic materials are notably weak in tension and great care must be exercised if they are so used.

The spalling test was devised to de-

loss is reported in per cent of the original weight.

While most of these tests may have been developed as a means of determining qualities, firing properties, etc., from a ceramic point of view they can, on the other hand, be used as criteria of their suitability in metallurgical applications. They fulfill a double role, depending upon the point of view.

Inasmuch as the foregoing tests are indicative of quality of the raw material and processing details, they are the basis of refractory specifications and classification of Committee C8, A.S.T.M. The data in Table VI for fire clay refractories are of interest here.

WHAT'S NEW IN PRESSES

By FRANK J. OLIVER

Associate Editor, *The Iron Age*

HYDRAULIC types continue to predominate in recent press designs as was the case when the last report was made on this class of industrial machinery in the Sept. 21, 1939, issue. The influence of war needs is seen in a long stroke press for drawing and tapering shells. Mechanical types are tending to fully inclosed mechanisms, and this is true of press brakes as well. One of the largest press brakes made will handle

work 33 ft. long. Among other types of sheet metal machinery may be found individual punching units, hydraulically actuated, and mechanical punch units for application to a press brake. New trucks have been developed for handling dies in and out of the press, also for elevating sheet packs, and a number of safety devices for press operation have been introduced. New designs in stock feed reels are also pictured.

ment is located around the base of the press, minimizing floor space.

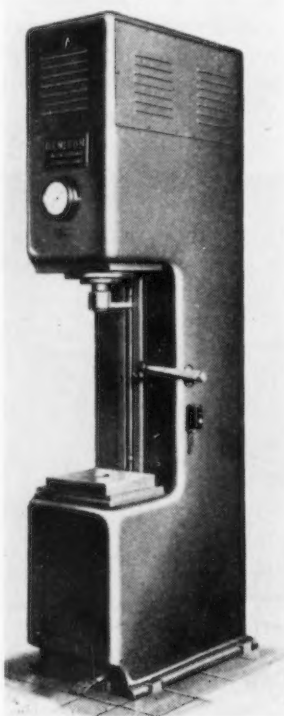
Utility Hydraulic Presses

FOUR capacities of vertical hydraulic presses for assembling, broaching, straightening and general production pressing have been introduced by the *Denison Engineering Co.*, Chestnut and Water Streets, Columbus, Ohio. Known as type DLAC 1, these presses are furnished in capacities of 5, 15, 25 and 50 tons, all with 26 in. maximum stroke and 15 x 15 in. rest plate size. Ram speeds range from 30 ft. per min. on the

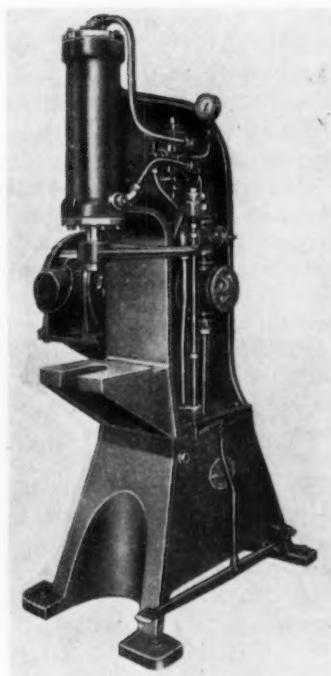
TO meet the modern high speed production requirements in the manufacture of artillery shells, the *Hydraulic Press Mfg. Co.*, Mount Gilead, Ohio, has been cooperating closely with Government arsenals in the design and development of modern presses to be used for this purpose. A typical example of the type of press now used for the production of artillery shells is illustrated. This H-P-M Fastraverse shell drawing and tapering press is of the self-contained type with oil hydraulic pressure being generated by the Hydro-Power radial, variable delivery type pump which is a part of the standard H-P-M closed circuit operating system. There are no operating valves between the pump and the main pressure cylinder. Ram travel is reversed simply by reversing the pump, permitting the oil to flow in the opposite direction. This type of pressure application permits the press to operate smoothly and efficiently with shockless reversal.

Rapid ram advance and return is accomplished by the Fastraverse application which permits the free flow of oil between the main cylinder and the overhead oil supply tank. With

the power unit mounted on a bracket securely fastened to the press head, no obstructive piping or power unit equip-



MODERN, clean cut lines distinguish the type DLAC-1 Denison hydraulic presses furnished in capacities from 5 to 50 tons and 26 in. maximum stroke. Integrally mounted pump and motor is within the upper part of the C-frame, behind the cylinder.



THE cast alloy semi-steel frame of this 10-ton Greenard hydraulic press is proportioned to give minimum deflection under load. By changing the motor and hydraulic equipment, five ram speed ranges are available within the same 2 1/2 to 10 ton capacity.

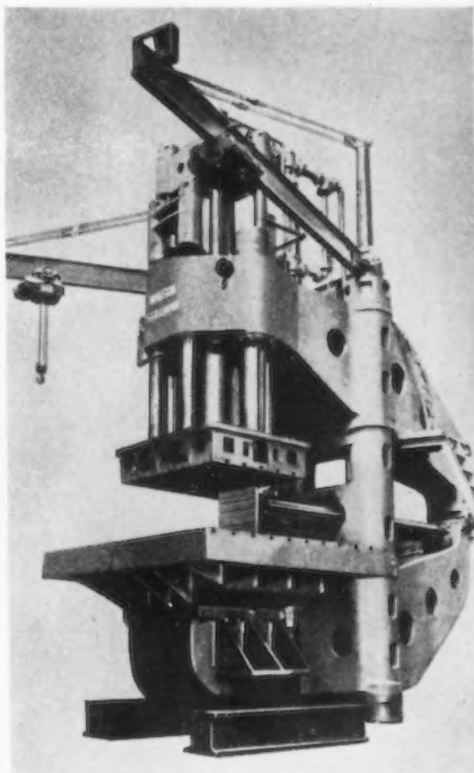
smallest size down to 7 ft. on the largest; return speeds are from 65 ft. per min. to 15 ft. respectively. Motor sizes vary from 7½ to 15 hp.

Frames of these presses are of electrically welded steel, with corners and edges rounded. The steel cylinder is flange mounted on the upper portion of the C-frame. Also located in the upper part of the frame, behind the cylinder, is the hydraulic pump integrally mounted with its driving motor. Under the motor-pump compartment is the oil reservoir. The magnetic motor starter and the pressure and directional controls are also located within the frame. Downward

movement of the ram is initiated either by a hand lever on the side or by stepping on a foot treadle. Releasing either control returns the ram to the top of its stroke and unloads the pump. Stroke adjustments for both upper and lower positions are made from set col-



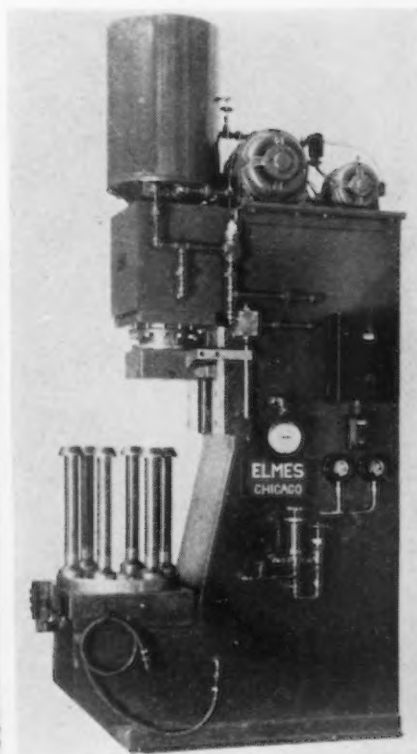
TYPICAL of the new line of H.P.-M shell drawing and tapering presses is the one illustrated with maximum ram travel of 120 in. and platen area of 30 x 30 in. Drawing presses are designed with a hole in the center of the press bed through which the drawn shell is pushed and stripped from the punch. Shell tapering presses have a mechanical ejector mechanism located beneath the press bed.



RECENTLY shipped abroad by the Watson-Stillman Co., Roselle, N. J., was this huge hydraulic flanging press of 1500 metric tons rated capacity. It has three single acting, moving down cylinders, providing an actual press working capacity of 500, 1000 or 1500 metric tons. In addition there are two pull back cylinders and a horizontal, double acting cylinder of 250 tons capacity. Stroke of the main cylinders is 59 in., that of the horizontal cylinder, 79 in. Bottom platen measures 14 ft. 9 in. by 12 ft. 5 in.; moving platen, 8 ft. 2 in. by 6 ft. 7 in.; horizontal ram, 24 by 20 in. This special press, one of eight of various sizes, was designed so that the work is readily and conveniently accessible.

lars located between the ram guides and the throat of the press.

ANOTHER small press recently introduced for the same general type of application is the new No. H-58 hydraulic press built by the Greenerd Arbor Press Co., Nashua, N. H. There are five models of this press, all of the same capacity, but by equipping the units with motors from 3 to 10 hp., and with single or double pumps, the full pressure working speed is varied from 56 to 208 in.



AUTOMATIC hydraulic marking press with six stations on the turntable, built by the Charles F. Elmes Engineering Works, Chicago. The table and ram may be moved independently of one another, but the machine is arranged so it will not stamp a blank mandrel. Range of pressure is from 15 to 100 tons, and the pressure may be released at a predetermined tonnage or after the die has marked the work to a specified depth. Operation is fully automatic and the cycle is controlled by push buttons. The machine is of all steel construction and is approximately 11 ft. in overall height.

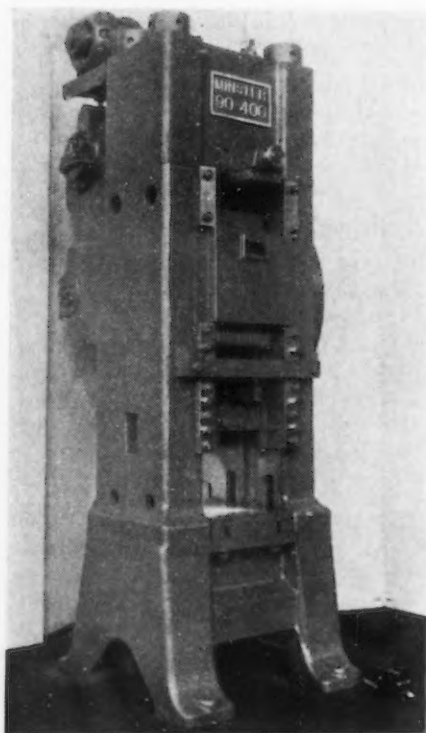
per min., and the rapid return speed from 120 to 280 in. per min. A rapid traverse speed up to 4 tons working pressure is also available. Stroke is 16 in. Same frame is used in all models, cast of alloy hydraulic semi-steel. Ram is put into motion by pressure on foot pedal. Pressure remains on work until foot pedal is released, at which time the ram automatically returns to a predetermined stop within the 16-in. range. Pressure may be set at any point between 2½ and 10 tons.

Inclosed Head Presses

THE E. W. Bliss Co., 53rd Street and Second Avenue, Brooklyn, has recently added a complete line of inclosed presses for the automotive trade and the general stamping field. This design is now available in many different sizes and in double crank, double eccentric, four crank and four eccentric types of slide actuation. In



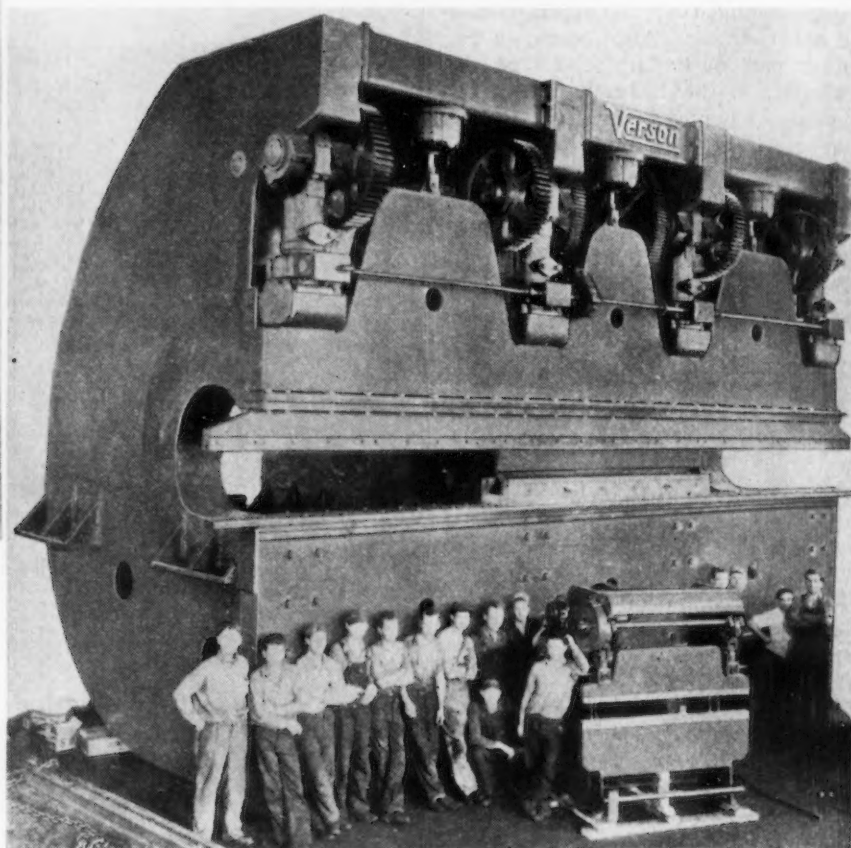
TYPICAL of the new line of inclosed Bliss presses is this 750-ton model with bed area of 80 x 120 in. Maximum die space, stroke down, adjustment up, is 60 in.; stroke, 24 in. The press shown is a four eccentric type, with connection to each corner of the slide. It operates at 14 strokes per min.



QUADRUPLE tie rod construction is used in the 90 series Minster knuckle joint embossing press, made in eight sizes from 150 to 1500 ton capacity. The 400-ton size is shown.

BELOW

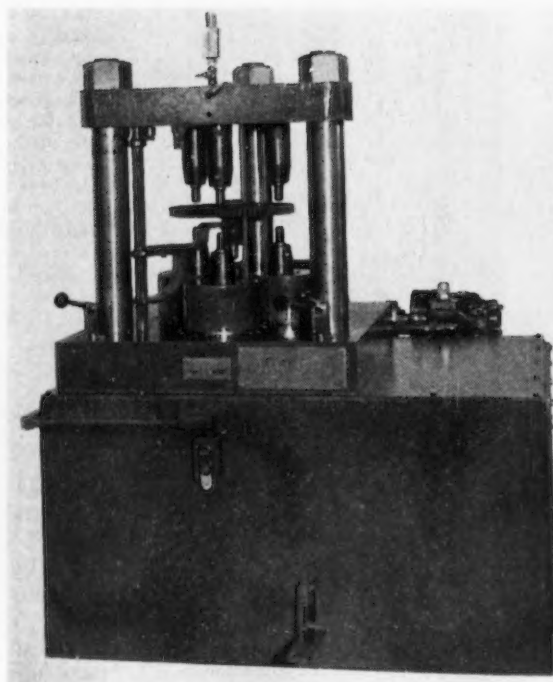
WHAT is probably the largest mechanical press brake ever built is this 1000-ton unit built by the Verson Allsteel Press Co. for fabricating steel plate for barge sections. The machine is capable of bending $\frac{5}{8}$ -in. steel plate 33 ft. long to a 90-deg. angle at one stroke. Slide has a stroke of 5 in. and is driven at four points at the rate of six or 12 strokes per min. It is air counterbalanced and has motorized adjustment, with direct reading indicators to facilitate die setting. Depth of throat is 60 in. Total weight about 440,000 lb.

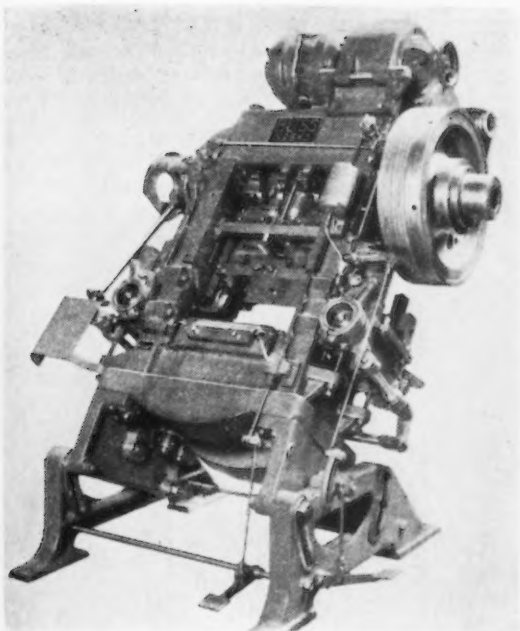


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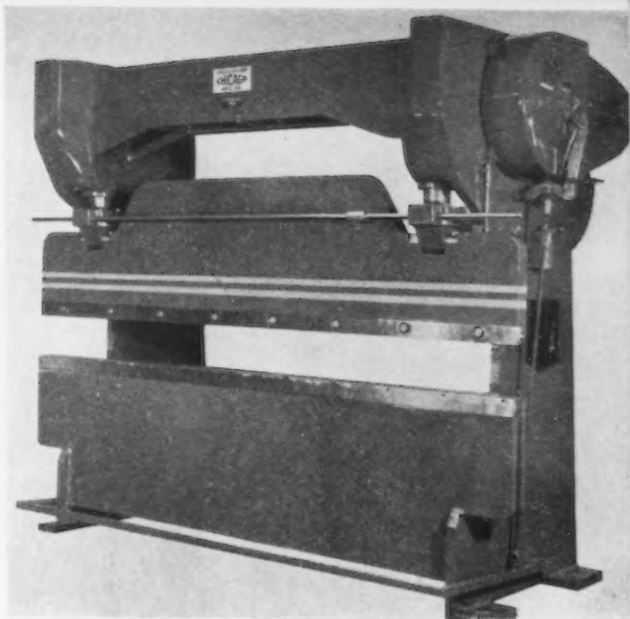
HANNA hydraulic riveter especially designed for gear and hub assembly. There are three sets of dies for simultaneously driving three rivets 120 deg. apart. The upper set of dies are mounted in a stationary platen supported by strain rods, and the rivets are set under hydraulic power by the movable lower dies. Motor driven pump supplies oil at 1000 lb. pressure and 25 tons is exerted between each pair of dies. For ease and safety in loading, the machine is provided with a swing-out arm and mandrel on which the hub and gear are loaded and rivets inserted with manufactured head up. After the swing arm is brought back into working position, the assembly is rotated by hand until the rivet heads register against the stationary die cups. This machine can perform 20 3-in. strokes per min. For safety, the press is controlled by two hand levers.





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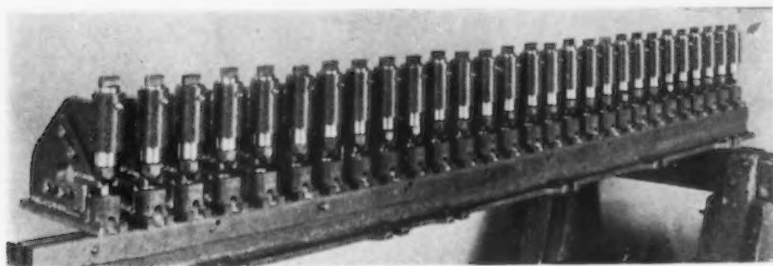
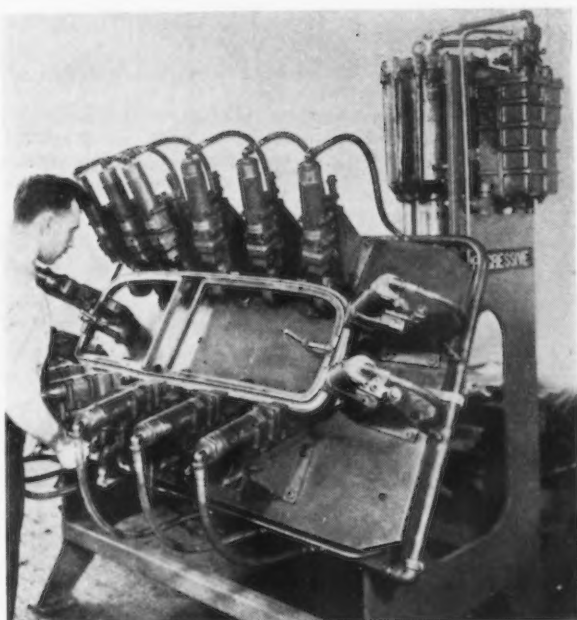
INCLINABLE mountings are now available for Bliss No. 645 series high production punch presses. Square pockets in the legs of the machine enable the press to be locked in an upright position or at two angles of incline. A variable speed drive gives an operating range of 100 to 300 strokes per min. Clutch is a high speed rolling key type. Stock feed mechanism as shown is optional.



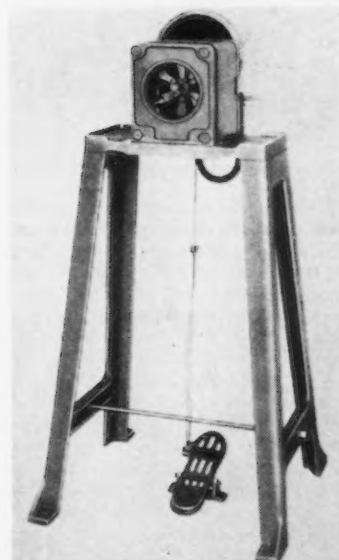
ALL gearing, eccentrics, ram plungers and ram adjusting worms and wheels are enclosed and run in oil in the new series L Chicago steel press brakes, offered by Dreis & Krump Mfg. Co. with modern, clean-cut appearance.

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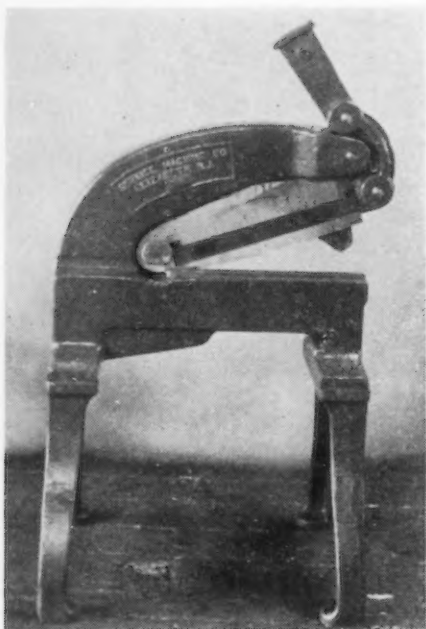
UPWARDS of 200 windshield and window moldings per hr. have 16 holes punched and countersunk with new hydraulic punching units developed by Progressive Welder Co., 705 Piquette Street, Detroit. By providing movement of both the piston and the cylinder and pressure in two steps, a clamping action is obtained at each unit position, thus eliminating costly cam dies for this function. When hydraulic pressure (90 lb.) is first admitted to the unit, the piston moves forward and brings a backing-up die in contact with the work, clamping it against a nesting form. The resulting back pressure built up trips a pressure switch, bringing a hydraulic booster into action, raising the pressure, and causing the cylinder to retract, together with its carriage and combination punch and countersinking tool, mounted on a yoke, piercing the work from the far side. The nesting form serves as a stripping plate when the pressure is removed and a spring returns the cylinder to its original position following the punching operation.



SEMCO No. 13 1/2 A multi-unit punches for use on press brakes having strokes up to 5 in. In this new size of punch unit put out by the Service Machine Co., 754 Broadway, Elizabeth, N. J., advantage is taken of the greater shut height provided on long stroke, heavy duty press brakes to use longer cylinders placed higher on the frames so that long stroke travel can be obtained. The units are designed to pierce holes up to 11/16 in. diameter in 1/2-in. mild steel. Minimum center distance is 2 1/2 in.; throat depth, 6 in.



PRACTICALLY any number of small holes within reasonable limitations may be punched in small zinc or aluminum cans and shields commonly used in the radio industry, or in paper, bakelite or similar tubes, by means of the model 1001 multiple hole piercing machine, made by the Automatic Mfg. Co., Inc., Harrison, N. J. The size range is 3/8 to 2 in. inside diameter. These holes may be spaced in practically any position around the tube and for a length of about 6 in. The initial tooling required for the average tube is roughly equivalent to the cost of a simple drill jig. Any size or shape of punch may be used. Production will vary from 1000 to 1600 pieces per hr.

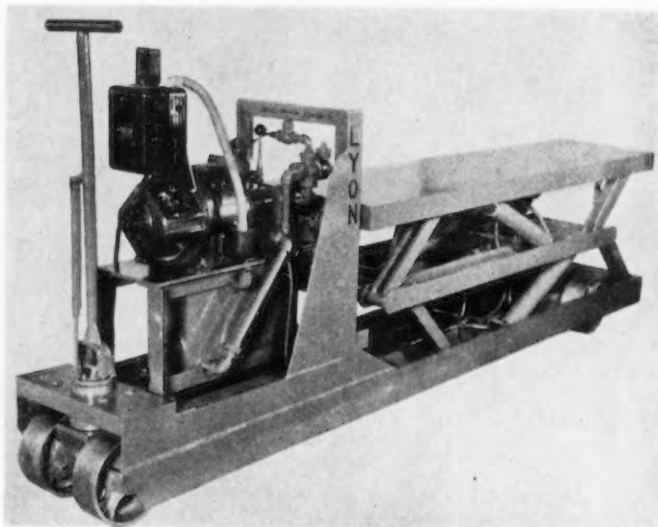


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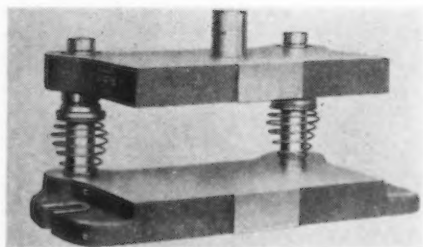
FOR use in jobbing sheet metal stamping plants, Service Machine Co., Elizabeth, N. J., is offering the Semco No. 16 hand slitting shear for use on sheet steel up to 10 gage. Corrugated or special shapes of sheet metal, such as flashing, can be cut by substituting special blades. The standard blades are made of high chrome steel for long service, and they are jig-drilled for interchangeability. Length of blade is 16 in.

AT RIGHT

FOR keeping packs of steel sheets at convenient heights for feeding presses and shears, the Lyon Iron Works, 505 Madison Street, Greene, N. Y., is offering the sheet handling truck illustrated. The truck is of the toggle lever type and the table is elevated by means of four hydraulic rams, pressure for which is furnished by a hydraulic pump driven by a 2-hp. motor. Lowering of the table is facilitated by a separate hydraulic ram. Elevation or lowering of the table is controlled by a directional hand lever. The truck may be had with a hand operated pump, also. The truck shown has a capacity of 6000 lb. Table size is 20 x 84 in.; lowered height, 22 in., elevated height, 40 in. Various other sizes and capacities are available.



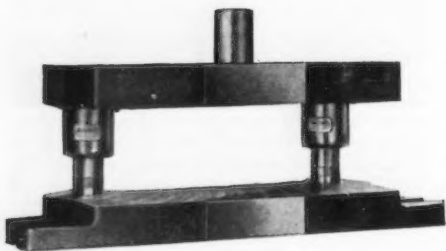
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ABOVE

COMPRISING a compression spring and an oil wick retaining ring, universal die set leader pin oilers are being offered by E. A. Baumbach Mfg. Co., 1812 S. Kilbourn Avenue, Chicago, to fit leader pins from $\frac{3}{4}$ to 3 in. in diameter and with spring lengths of $2\frac{1}{2}$ to 8 in. The low tension spring lifts the ring to sufficient height on the up stroke to assure spreading a film of oil on almost the entire length of the pin. By stopping the press, compressing the spring by hand and swabbing the pin with oil, which the wick absorbs, continuous lubrication is obtained. The springs also act as a safety guard.

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DANLY safety guide post covers are made in three styles: Telescoping covers for entire guide post and gap; telescoping covers for the gap only, and single covers for the gap only. Top units are made in lengths of 1 to 8 in. in $\frac{1}{4}$ -in. increments, depending upon the diameter. These guide post covers are readily attached to new or old die sets, and the bayonet type fasteners permit quick removal. Oilers, consisting of a metal inclosed felt ring, can be inserted in the top unit. These units are supplied by Danly Machine Specialties, Inc., 2130 South 52nd Avenue, Cicero, Chicago, Ill.

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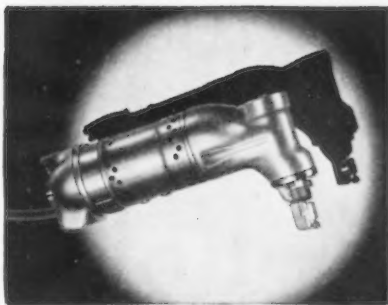
LYON hydraulic die handling truck furnished with a two-speed hand operated hydraulic pump for elevating heavy or light dies. The truck shown is of 2000 lb. capacity with a table 24 x 36 in.; lowered height 15 in., raised height, 45 in. Truck proper is of the casted steel type and is equipped with a brake. As originally furnished, the unit was equipped with a die separating and turning device and a special adjustable clamp for holding various size dies. There is also a hand operated winch for pulling dies on and off the table. It is located on the table slide and rises and falls with it. This truck can be furnished in various specifications by the Lyon Iron Works, Greene, N. Y.

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the four eccentric type illustrated, the eccentric shafts run front to back, with the main bearings mounted in the heavy crown ribs. The press is double geared, with herringbone steel gears throughout the main drive and twin driving gears on the eccentric shafts. The clutch is of the latest design and is operated by electric push button control. Flywheel is mounted on Timken roller bearings and is provided with a brake. Barrel type connections on the slide give an adjustment of 6 in. by electric motor. The slide is precision gibbed at all four corners, with the sliding surface lined with bronze. Counterbalance cylinders are mounted in the uprights and bed, preserving smooth exterior lines.

Knuckle Joint Presses

EIGHT sizes of knuckle joint embossing presses, all of quadruple tie rod construction and ranging in capacity from 150 to 1500 tons, have been introduced by the *Minster Machine Co.*, Minster, Ohio. The knuckle action provides a dwell at the bottom of the stroke, making such presses suitable for coining, embossing, sizing, heading, heavy stamping, cold forging and similar operations where a delay at high pressure is required to permit metal to flow or set. The 600-ton and larger presses have the Minster air operated combination multiple disk clutch and brake as standard equipment, whereas this combination is optional on the smaller sizes, normally fitted with a positive clutch. The knuckle assembly is equip-



ONLY 9 in. long and weighing but $3\frac{3}{4}$ lb., this Thor nibbler is said to be powerful enough for sheet metal shop production and for on-the-job installation work. It will cut steel up to 18 gage and aluminum up to 15 gage.

• • •

ped with oversize alloy steel knuckle pins, fitting in hardened and ground steel bushings. Each knuckle bearing is connected to a high pressure lubricating system and in addition a cascade of oil flows over the knuckle assembly. A dual oil filter assures a clean oil supply.

Steel Press Brakes

NEW features embodied in the series L Chicago steel press brakes include "streamlined" design, with all gears and working parts enclosed and running in oil, and a new type of cushioned friction clutch. All main members are constructed of steel plate. Presses are of the double eccentric type, with each eccentric and main bull gear made in one piece. Ad-

justing screws are incased in sleeve-like plungers and operate in a vertical non-oscillating position throughout the stroke. The friction clutch has only one moving part, requiring little adjustment, and a brake is combined with the clutch. A variable speed drive allows a range of speeds from 15 to 45 strokes per min.

These type L machines are made in three sizes by the *Dreis & Krump Mfg. Co.*, 7430 S. Loomis Boulevard, Chicago, to take care of a range of plate from 3/16 in. by 4 ft. long up to 14 gage and 10 ft. long, up to 14 gage and 10 ft. long. The stroke is 2½ in., adjustment of ram 3 in. and die space 6½ in.

Portable Sheet Metal Nibbler

A SMALL portable electric nibbler for cutting all kinds of sheet metal has just been introduced by the *Independent Pneumatic Tool Co.*, 600 W. Jackson Boulevard, Chicago. It is a compact type tool with a yoke type front head incorporating a punch and die that nibbles out a rectangular shaving of metal at each upward stroke of the punch. Because it cuts its own clearance, this Thor nibbler will cut wide strips without distorting or curling the sheet, even if it is corrugated or has a curved outline. Internal cuts of any shape can be made by drilling or punching a hole 1 in. in diameter and inserting the head of the tool in this hole. Shapes can be cut out of tubing as small as 1½ in. diameter. Limiting radius on flat work is about 1 in.

The cutting punch of the unit is
(CONTINUED ON PAGE 96)

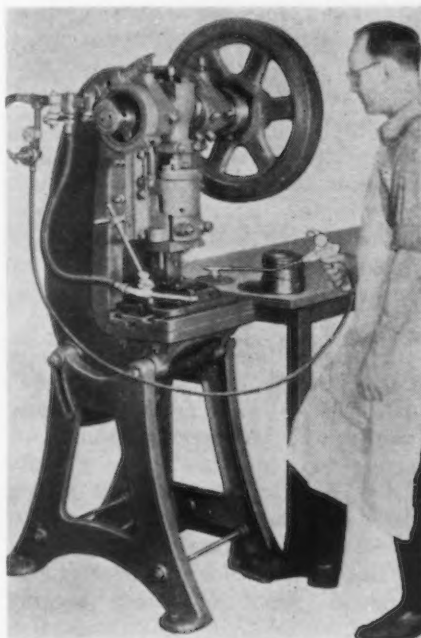
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PNEUMATIC counterbalance cylinder for use on large presses with long stroke. Common applications require two to four cylinders on each press. Cylinders are supplied in diameters from 6 to 14 in. and in strokes from 10 to 30 in. Each set of cylinders is furnished with a pneumatic regulator and gage to compensate for variations in slide and die weights, together with surge tank equipment. These cylinders are operated from the regular shop air supply. They can be mounted in the crown or on the press bed frame. Piston stems are chrome plated. Supplied by Dayton Rogers Mfg. Co., Minneapolis.

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AT RIGHT

LITTELL Pres-Vac safety feeder is used for picking up flat surface materials and feeding them into punch presses while keeping the operator's hands out of the danger zone. The device consists of a pistol grip handle with trigger and a single or double vacuum cup attached to an extension. Vacuum remains on as long as the trigger is held closed. The method of obtaining the vacuum is novel. Air line pressure reduced through a regulator to 20 to 45 lb. is sent through a venturi orifice, creating a vacuum at the neck. The double cup feeder is used for handling work with a hole in the center. The exhaust air coming from the tip of the feeder can be utilized to blow out the die. For picking up work not suitable for handling with a vacuum lift, air actuated mechanical pickers are offered by the same manufacturer, the *F. J. Littell Machine Co.*, 4151 Ravenswood Avenue, Chicago.



THIS WEEK ON THE

ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

... Mid-winter adjustments trim auto production to 108,545 units ... SAE sessions and exhibit throw out hints of future technical improvements ... Electric windshield wiper, barrel type engine, and surface finish are among highlights ... Management told to check trend to totalitarianism ... Pilot mill to make wire from slits of strip steel.

DETROIT—A moderate downward drift in automobile production occurred during the last week but the reduction is not significant and is regarded as only a phase of the seasonal adjustments that are normal in mid-winter. Output was estimated at 108,545 passenger cars and trucks by Ward's Automotive Reports, compared with 111,330 in the previous week and 90,205 in the corresponding period last year.

The output of Ford Motor Co. plants for the week is estimated at 25,650 units, an increase of about 100, of which 24,900 were Fords and Mercurys and 750 were Lincoln-Zephyrs. Plymouth assemblies stood virtually unchanged at 12,560, and total Chrysler volume stood at 27,105, compared with 27,115 a week earlier. Chevrolet and the General Motors group output sagged slightly. Chevrolet assemblies dropped 500, to an even 27,000, while General Motors eased off from 46,234 to 45,140.

It is evident that decreases occurred principally in the ranks of the independents, but major companies still have healthy backlogs of orders, plus a sizable job just to provide floor models for retail outlets which have experienced a shortage so far this year.

Strictly in line with seasonal trends, the industry is expected to accommodate itself to lower production slowly in the next few weeks without any severe drop, but should stay substantially above last year's levels during the winter lull. It is conceded that recent peak production will probably be the largest which the industry will experience until the spring upswing begins.

The last week saw a large part of the industry, speaking of personnel, forget all about plant production and immediate problems to project itself pretty far into the future. It was convention week for the Society of Automotive Engineers and time for the semi-annual national meeting. It was the occasion for more than two-



A LONG - HELD theory in some quarters that minute surface marks on automotive cylinder bores should be parallel to the direction of piston motion is being applied in aircraft engine manufacture by a tool like this one introduced at the annual SAE meeting in Detroit last week. Interlocked abrasive stones, vitrified bonded, are expanded on this Micromatic hone to form an abrasive plug which hones the bore in the usual manner, then is drawn up and down the bore to produce the desired final surface, called Codirectional Drawfinish.

score engineers to present technical papers, for hundreds more to meet with technical committees handling SAE research projects or standardization programs, and for pretty close to 2000 engineers to attend a series of technical meetings and also the industrial-automotive exhibit which has become a feature of the mid-winter SAE meeting in Detroit each year.

Like other good industrial and technical shows this one each year provides new items of interest that could almost be used as points for plotting a trend curve to show the course of technical improvements in the automobile industry. For instance, plastics received a good share of attention and, among the accessory items, an electric windshield wiper, which will not stall for lack of vacuum, might be an indication of more widespread use of this type of wiper in future models. One car manufacturer added them to a line of cars at the start of the 1940 season. These accessories represent increased costs but they are a concession to definite consumer demand.

Barrel Type Engine Shown

A barrel type engine, although not exactly new, received a lot of attention also. This engine has been previously described, but continues to attract interest because it offers automotive engineers a lot to think about for the future. This engine has six cylinders arranged co-axially with a central shaft. Pistons are double ended with an open bearing slot and trunnion rollers. Pistons are operated by a large cam or wobble plate mounted on the shaft. Valves and valve mechanism are in the cylinder head.

Many major problems have been overcome in the design of this engine but its sponsor, K. L. Herrmann of South Bend, declares that pistons still present a major problem. So far, the pistons have been sand castings and it is suspected that shrink strains and fissures in the casting are attributable to the irregular sections that are used. Literature on the subject declares that these pistons are being replaced by a forged piston which it is hoped will

ACCURACY . . .

killed the clatter



IT seems like yesterday that automobile manufacturers were thumping their chests over cars that would run "without smell or objectionable noise." Today's youth takes his sleek, silent, air-conditioned automobile as a matter of course. Accuracy makes the difference. Accuracy that turns out automotive parts to the closest of tolerances as fast as the hot chips fly—accuracy in selective assembly—has given mankind the miracle of low-cost transportation. Now you can step into your car to go one mile or a thousand without a thought of breakdown. Do you remember when every mile was an achievement? Accuracy has made the difference.

Accuracy at Pratt & Whitney is the fulfillment of the founders' dream, a tradition close to the hearts of over 2000 skilled Pratt & Whitney craftsmen. Every machine tool, every cutting tool, every precision gage built by these men passes along Pratt & Whitney accuracy to the products it makes. When you buy machine tools, small tools, and gages, investigate Pratt & Whitney precision equipment. It pays dividends.



PRATT & WHITNEY

Division Niles-Bement-Pond Company • Hartford, Connecticut, U. S. A.

overcome present difficulties. Built-up steel pistons and cast iron steel pistons have also been the subject of some study.

Interest in Surface Finishing

Talk about fine surface finishes again held the center of the stage, with indications that automobile engine designers, aircraft engine designers, piston ring manufacturers, machine tool men and lubrication experts are going to be doing a lot more about the subject in the future. Three of the really new items in the show were concerned with surface finish. The ingenious surface analyzer mentioned in "The Assembly Line" column a few weeks ago was exhibited for the first time. Interest in it is attested by the fact that the doors of the show had hardly opened when an order for one of these surface measuring instruments was placed by an executive who had never seen one of these instruments before and had not even heard of it until 72 hours before the show opened.

The second item is one which portends some important changes in the

processing of cylinder bores to obtain a specialized type of surface finish. Importance is lent to this subject by inside knowledge that the technique involved is one which was virtually forced upon aircraft engine manufacturers and builders of machines and tools by Army and commercial aviation experts.

Codirectional Drawfinish

As a result of a great deal of practical experience in cooperation with the aviation field, Micromatic Hone Corp. made the announcement at the SAE exhibit of a new type of tool which has given birth to a new kind of surface condition for cylinder bores—called Codirectional Drawfinish—which simply means that all of the infinitesimally small tool marks or grit marks on the inside of the cylinder bore are made to run lengthwise of the bore so they match the marks which are eventually imposed in service.

Aircraft engine users have for some time followed the practice of finishing cylinder bores by what they called straight-line lapping. Hand tools were first used for this but eventually avia-

tion engine manufacturers and the air services specified special tools for the purpose. These were cast iron lapping tools which, together with segmented abrasive stone honing tools, form the background for the new development. (See photograph.) This tool differs from the conventional in that straight segmented stones are replaced by interlocked sets of stones (vitrified bond, silicon carbide, in most cases) which are axially disposed about a solid backing which is against a cylindrical cone to provide expansion to final bore diameter. The tool is first used as a conventional hone (rotated and reciprocated) then is drawn up and down the bore to produce the co-directional drawfinish.

As if to round out this information about surface finish, came the acknowledgment that the Perfect Circle Co. has been engaged in studying surface finish on piston rings and bores. Macy O. Teetor indicated at the SAE exhibit that some place in the data which will be eventually accumulated, engineers may learn where "wear-in" ceases and "wear-out" starts. The automotive cylinder, piston and ring combination is certainly the one which offers the greatest number of problems, because chemical corrosion, thermal and mechanical distortion, border-line lubrication, high temperature and pressures are involved. That is why, if automotive engineers answer their own questions, they will be supplying a lot of valuable information for designers and manufacturers of a thousand other products.

Security for Labor

"What's Ahead for Management," brought from W. L. Batt, president of SKF Industries the assertion at the annual SAE banquet that it seems inevitable "that the pendulum will swing still further in the direction of security of labor." His theme is summed up in the statement: "How fast unionism, as the force to implement the collective bargaining principle for labor, is to grow, will be considerably influenced by our attitude as employers." Business management, alone, can save the private property system and provide the check which will halt the trend toward totalitarianism, he said. Mr. Batt is a recent appointee as chairman of the Business Advisory Council for the Department of Commerce.

Drawing Wire from Strip Steel

Slitting of strip steel into shape for drawing into fine wire will be demonstrated shortly in a pilot mill setup to be installed near Detroit. Plans call

THE BULL OF THE WOODS

BY J. R. WILLIAMS



for operating with two 6-in. strips, which is figured to give a capacity of 96 strands at 300 ft. per min. The process, patented by a major concern, has been obtained by a group of Detroiters, it is understood, and their demonstration mill will be forerunner of others which they hope to license. Non-ferrous, aluminum and copper, as well as steel wires are covered in the plans which are being discussed. A major equipment supplier has plans to furnish required equipment.

Briefly, the process consists of slitting strip into sections which are approximately octagonal, then welding the resulting "rod" together, finally drawing to the desired wire size and cross-section. Savings, including lower cost of strip compared with rod, is estimated between \$10 and \$15 per ton. If such a process proves practical, it will provide a most unusual outlet for some of the extra capacity which the continuous mill has made available in this country.

Assembly Line Briefs

Three trainloads of Ford farm tractors, shipped from the Rouge plant recently, were the advance guard of 29 trainloads to be shipped before the end of February. The 29 trainloads will absorb virtually all the Ford tractor production for the next month. . . . And the 100,000th Mercury car was presented with ceremonies to a surprised couple from Anacortes, Wash., last week. They ordered a car through a local dealer and came to Detroit to drive it home, unaware of the minor fame which would engulf them. . . . More than \$500,000 and a national precedent are at stake in a legal fight in Colorado to force automobile manufacturers to pay chain store taxes for all of their dealers in that state. A test suit against Ford has started, but seven manufacturers will be billed for \$530,130 in taxes back to 1935 if the State wins. . . . The new Fruehauf stainless steel trailers are going into production in Fruehauf and Budd plants here. Budd is also busy with military truck body fabrication and Willys and Packard auto body work. . . . More financing plans are being worked out to allow Graham-Paige to resume 1940 production, curtailed by lack of capital again this year. . . . But Packard has erased a nine-month net loss because of its increased sales in the final quarter of 1939 and year-end adjustments, according to M. M. Gilman, president. Loss in the first nine months of the year was increased by the temporary shut-down and rearrangement of manufacturing facilities, but it is all off the slate now.



CHAMFERING GEAR TEETH

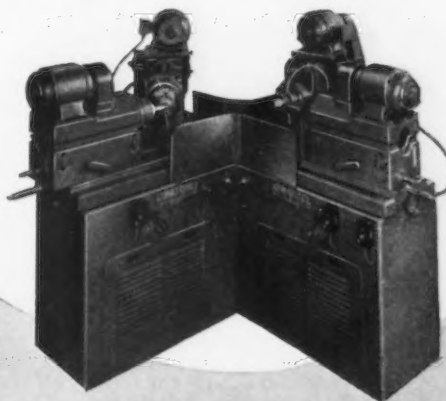
Is Now An Inexpensive Production Operation

CIMATOOL chamfering machines incorporate the principle that has finally combined flexibility with economy in gear tooth chamfering. Instead of presenting the tool to the work, Cimatool machines are built on the principle of presenting the work to the cutter, which rotates in a fixed position. This allows a heavier cutter spindle mounting and provides greater stability throughout.

Further, it permits the use of the hollowmill and pencil cutters as well as end mills and special cutters. Practically any type of chamfer is available from a regular wedge to any combination of circular arcs.

The work head incorporates all the mechanism necessary to the control of the machining operation. It is independently driven and its indexing movement is mechanically positive (always locked in mesh). Because of this construction it is not only quicker to set up but it provides higher production speeds.

The work gear spindle moves forward and backward in instant response to the rotation of a guide cam in the head assembly. The shape of this cam may be varied to provide any rate of cutting feed and in the case of pencil cutters an almost infinite variety of chamfers.



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FOR COMPLETE
INFORMATION

THE CIMATOOL COMPANY
Dayton, Ohio, U.S.A.

DIEMAKERS • MACHINE TOOLS • TOOL MAKERS

THIS WEEK IN WASHINGTON

... Is Congress really driving for economy? Industry wants more evidence ... U. S. merchant marine reported suffering little so far from war ... NLRB had poor case against us, Armco executive says ... FTC issues order against AFL union.

By L. W. MOFFETT
The Iron Age

WASHINGTON—Congress may mean business in raising the flag of economy. If it does, the move will mark an epic in the fiscal policy of the federal government during the past seven years and should be a business stimulant. A genuine halt to the wild spending spree by the overwhelming bureaucracy that has been erected would go a long way toward restoration of confidence. Confidence is necessary for the loosening of billions of frozen private credit for investment. Putting this idle money to work will put idle men to work. But until Congress has finally acted on appropriations and authorizations, and analysis is made of them as they relate to income and outgo, there will be no assurance that a balanced budget is in sight. Moreover, it is necessary that a policy of economy be permanent, rather than a temporary political sop.

Mere Chicken Feed

The sums lopped off so far by the House are mere chicken feed compared with the expenditures of billions, but if the cuts really reflect an economy move and are approved or slashed further by the Senate they are significant. It may well be that, taken with the President's predicted income, a balanced budget may be realized or at least in prospect. Unfortunately, however, Congress in the past has given the country the impression that it is economizing, while in reality it has added to government costs. One method of doing this trick is to strike out or reduce budget recommendations for appropriations and then to make authorizations. But that was not done by the House. On the contrary, it knocked out a proposed \$150,000,000 maritime Commission contract authorization. Meanwhile, the House Naval Affairs Committee has voted to

cut \$500,000,000 off the \$1,300,000,000 authorized in the naval expansion bill. Hence, it may be that after all Congress is seriously bent on economy and not simply making an ostensible splurge to outdo the White House's timid economy move if, in view of the loopholes left in the budget message, it can be a sort of an economy move. The President's plan was to keep within the \$45,000,000,000 national debt limit by assuming revenues of \$5,547,960,000, and enacting special taxes of \$460,000,000 for the national defense. This being an election year, he probably knew Congress would not enact tax legislation—and it is pretty much of a foregone conclusion that it will not do so until after election.

A Slicing Process

Instead, the strategy is to kill appropriations sufficient to make taxes unnecessary at this time. In its slicing process, the House has struck at the White House by denying funds for the National Resources Planning Board, the Office of Government Reports, formerly the National Emergency Council, and the Council of Personnel Administration. The significance of refusing to vote these funds did not lie so much in the fact that it meant a saving of \$2,140,020 as in the fact that it would eliminate three executive-created agencies. The House Committee on Appropriations, possibly reflecting an effort by Congress to curb powers that hitherto have been given so freely to the President, reported that it could find no "legislative history" authorizing the existence of these agencies. In all the appropriations voted by the House in the Independent Offices Supply bill are \$94,517,206 under the budget recommendations. The President, who has occasionally taunted Congress

about how it would cut government costs, became aroused over the axing of the New Deal bureaucracy and vigorous efforts are being made to have restored the budget funds in full, including those for these bureaus. Whatever success the White House may have it has been given at least a partial answer to its challenge to slash government costs and has been put on the defensive, a position in which it attempted to place Congress.

Sea of Red Ink

But manifestly only the surface has been scratched—and it remains to be seen whether the scratch will be rubbed out—in cutting government costs, which, despite heavy taxes, keep the Treasury foundering in a sea of red ink. It is idle to say that several billions could not be saved by eliminating numerous superfluous bureaus of the 115 that now have been fastened to the federal structure. Many of them do nothing worthwhile, make a drain on the taxpayers and are only political jobholding appendages. The functions of others are to harass business and spend lavishly. In addition, right now they are whirling cogs in a machine engaged in pouring out miserable third-term ballyhoo, with its shabby nonsense about "drafting" Roosevelt, as though this is a one-man country and an autocracy is preferable to a republic.

Payroll Army Vast

When it is recalled that the sprawling, unnecessary Government bureaus engage a vast number of payrollers it is realized that to strike all of the useless bureaus out at once would mean actual suffering, but eliminations could be proceeded with on a reasonable basis until the Government had been cut to a respectable, efficient size and money saved with a resultant business confidence could take up not only those leaving the Government payroll but many now unemployed. Adding greatly to this confidence would be plain, irrevocable denunciation of any third-term idea. Zealous, organized promotion of third-term talk undoubtedly increases business jitters. The fact that the White House does not rebuke the campaign, for it amounts to a campaign, assuredly gives the impression that it has both White House approval and encouragement, regardless of whether the impression is or is not correct.

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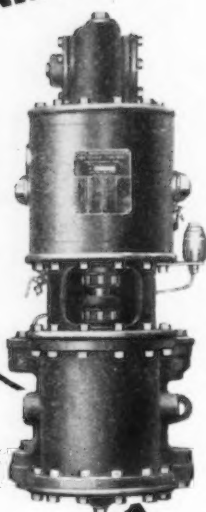
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NLRB Had Poor Case Against Us, Armco Executive Says

WASHINGTON — Implications that the American Rolling Mill Co. as well as the National Labor Relations Board has been responsible for the delay in reaching a settlement of the two-year-old case growing out of a CIO complaint filed in December, 1937, made during the course of testimony last week before the special House committee investigating the NLRB, prompted a statement from an official of the company that to have accepted the board's proposal for a settlement would have been "equivalent to admitting we were guilty of violating the Labor Relations Act when we were not."

C. H. Murray, assistant to Charles R. Hook, president of the company, said in a statement issued at Middletown, Ohio:

"The company was approached on numerous occasions by representatives of the board who seemed very anxious to settle the case. However, at no time did they offer a settlement which could be accepted. We refused to compromise."

A Poor Case Against Us

"To have accepted would have been equivalent to admitting we were guilty of violating the Labor Relations Act when we were not. The board knew it had a very poor case against Armco and was trying to get out of an embarrassing situation."

Reference to the Armco-NLRB case, on which a trial examiner's report has never been written because of voluminous record involved (25,000 pages of testimony and several thousands exhibits), was made by Committee Counsel Edmund M. Toland when he called NLRB Trial Examiner George Bokar to the stand. During the course of his examination, Mr. Bokar was described in a letter read into the record as "almost getting down on his knees" to company attorneys in his endeavor to settle the case.

Mr. Bokar told the committee that he had encouraged a prompt settlement because he felt that all parties concerned would be better off. His testimony was that the dispute came close to being settled last year under an agreement with Karl Jacobs, company attorney, who told Mr. Bokar that a stipulation would be signed within half an hour after his return to the company's plant in Middletown.

"Do you think," asked Committee

Chairman Howard W. Smith, "that a situation like that ought to be permitted to exist for three years while the board decides what it is going to do?"

Settlement Falls Through

"No, I don't," Mr. Bokar responded, reiterating that an agreement had been reached between the board and company counsel. The witness related that he telephoned Washington about the proposed stipulations and later explained them in person. Board officials, he said, thought there would be no difficulty in completing a settlement.

"I don't know to this day," Mr. Bokar said when asked why the settlement had fallen through. He added that he had "heard" that Mr. Hook, president of the company, refused to sign the stipulation upon his return from Europe, where he had been a member of President Roosevelt's commission studying labor relations in England and Scandinavia. Mr. Bokar was not certain, however, "if it is a fact."

According to another letter introduced into the record, Philip G. Phillips, NLRB regional director in Cincinnati, once told the board in Washington that the company was "not on the level in trying to settle" and that they "have twice welshed on propositions made."

"I see no hope in doing anything but going and making 'Little Steel' realize that we are just a little bigger than they are," Mr. Phillips' letter continued. He charged in another letter submitted for the record that the American Rolling Mill Co. had been in communication with other steel companies involved in the 1937 strike and had helped draft strike policy for companies affected.

Demonstrations Feared

The testimony further revealed that when the NLRB called hearings in the Armco case, it specifically instructed its trial examiner to refuse to hold the proceeding in Ashland, Ky., as requested by the company. The reason cited was that board attorneys were fearful of threatened "demonstrations."

The hearing had been scheduled for Catlettsburg, a few miles from Ashland, and a letter written by Mr. Phillips suggested that the trial examiner disregarded all efforts of company attorneys to take the case to Ashland.

The hearing was later held in Catlettsburg.

Mr. Bokar was one of several trial examiners called to testify last week before the committee. Mr. Toland, having stripped the NLRB files on trial examiner reports and inter-office memoranda, has been questioning the examiners themselves closely about certain cases and their attitude toward the various interests involved.

USHA Building Material Outlay Given as \$280,000,000

WASHINGTON — The United States Housing Authority, whose low-cost housing construction program is about 40 per cent completed, has offered figures indicating that \$280,000,000 will have been spent for building materials when the \$770,000,000 program is completed. This included:

Reinforcing steel	\$14,500,000
Structural steel and ornamental iron	14,500,000
Metal windows, doors, bucks, etc.	12,100,000
Plumbing equipment and materials	30,700,000
Hardware	3,800,000
Heating and ventilating equipment	24,000,000
Sand, gravel	12,000,000
Brick, tile, stone	29,000,000
Concrete products	18,000,000
Electrical materials, fixtures, machinery	15,000,000
Lumber and millwork	28,000,000
Plaster, lath and wall boards.	13,000,000

The present USHA program provides for construction in 168 communities of 160,000 family units to house 640,000 persons. Estimates are that more than 40 per cent of this construction is under way and that about 21 per cent will be completed by next June.

Loan contracts totaling \$581,776,000, representing 90 per cent of a \$646,569,000 total estimated cost of 346 projects, have been approved for 147 communities, the USHA said. As of Dec. 31, 1939, commitments, including loan contracts and earmarkings for additional loans, totaled \$666,808,000.

W. L. Batt Succeeds Harriman

WASHINGTON — William L. Batt, Philadelphia, president, SKF Industries, was elected last week as chairman of the Business Advisory Council, Department of Commerce, succeeding W. Averell Harriman, chairman, Union Pacific Railroad. John D. Biggers, Toledo, president, Libbey-Owens-Ford Glass Co., was elected a vice-president.



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P H I L A D E L P H I A

Scrap Stocks by Consuming Districts Shown by Bureau of Mines Survey

WASHINGTON — Following a preliminary statement issued on Dec. 4, 1939, the Bureau of Mines has released state and district details of its first survey of domestic stocks of iron and steel scrap at consumers' and dealers' plants and in transit at the end of September, 1939. The later figures reveal only minor changes in total tonnages, but show substantial variations in the stock position in various parts of the country.

Final returns indicate that available stocks of domestic iron and steel scrap exceeded 7,111,701 gross tons on Sept. 30, 1939. This total includes 2,463,701 tons on hand and in transit to suppliers' yards and an estimated 2,910,000 tons of purchased or merchant scrap and 1,738,000 tons of home scrap on hand and in transit to consumers' plants. The estimate of consumers' stocks is based on the assumption that companies reporting their inventories held 90 per cent of the total stocks on hand at consumers' plants. Scrap consumption in September amounted to

3,057,000 tons, indicating that known stocks held by consumers and suppliers at the end of the month were equivalent to 10-weeks' supply. In western Pennsylvania, reported stocks of home and purchased scrap were equivalent to at least a six-weeks' supply at the estimated total rate of consumption in September. The district comprising eastern Ohio and West Virginia had a seven-weeks' supply on hand, and the other principal scrap-consuming regions had from seven to 10-weeks' supply available. Inventories in the New England and Western states equaled a 17 and 19-weeks' supply, respectively, and the district including Arkansas, Louisiana, Oklahoma, and Texas had sufficient scrap to last 93 weeks at the rate of consumption in the area during September.

A second survey of the scrap iron and steel industry is under way and will furnish an appraisal of the situation as of Dec. 31, 1939. This canvass, in addition to the branches of the trade covered by the first survey, will

include a representative number of the larger industrial plants that produce scrap for sale.

In showing the geographical location of stocks and consumption of iron and steel scrap and pig iron, the United States has been divided into 11 districts, each of which represents a consuming area. The states of Pennsylvania and Ohio are each divided into an eastern and a western portion. In Pennsylvania, the portion which lies east of a north-south line drawn through the eastern limits of Johnstown is included in a district which also includes other States, while that portion west of this line is shown as a separate district. Similarly, Ohio is divided by a line drawn from Sandusky to Marietta.

In appraising the consumers' returns, it should be borne in mind that the coverage of the survey is designed to include 92 per cent of the total tonnage of scrap consumed in the United States, using 1938 as a basis. For this reason, the coverage by states and districts shows significant variations owing to the fact that the canvass includes complete coverage of steel making furnaces, while only 90 per cent of the 1938 tonnage of total scrap used

Summary of reported stocks of ferrous scrap and pig iron on hand September 30, 1939, and reported consumption in September, by districts, in gross tons

District No.	State	Purchased Scrap				Home Scrap		Pig Iron	
		Stocks On Hand			Consumed ¹	Stocks at Consumers' Plants	Consumed ¹	Stocks at Consumers' Plants	Consumed ¹
		At Suppliers' Yards	At Consumers' Plants	Total					
1	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont	102,681	73,654	176,335	25,045	31,219	9,066	133,783	8,847
2	New York	205,376	166,628	372,004	71,219	112,216	85,001	468,659	2159,453
3	Delaware, District of Columbia, Maryland, New Jersey, Pennsylvania (East), and Virginia	351,511	243,609	595,120	134,624	212,957	191,584	427,686	2274,824
4	Pennsylvania (West)	107,841	303,935	411,776	149,359	259,507	323,244	455,053	2736,152
5	Ohio (East) and West Virginia	127,159	590,246	717,405	237,940	241,254	367,111	389,833	2638,160
6	Indiana, Kentucky, and Ohio (West)	192,013	351,575	543,588	228,187	338,504	245,283	321,329	368,077
7	Illinois, Michigan, and Wisconsin	566,100	430,978	997,078	206,673	284,487	245,078	620,580	2365,067
8	Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee	101,437	82,542	183,979	51,272	44,713	56,667	265,602	2178,818
9	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota	321,418	120,804	442,222	41,963	7,696	22,937	22,924	18,396
10	Arkansas, Louisiana, Oklahoma, and Texas	151,145	23,243	174,388	3,661	428	1,819	842	31
11	Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming	237,020	232,215	469,235	68,143	31,482	33,144	73,458	36,776
	Total	2,463,701	2,619,429	5,083,130	1,218,086	1,564,463	1,580,934	3,179,749	22,784,601

¹ As reported. Total consumption estimated as follows: purchased scrap 1,358,000 tons, home scrap 1,699,000 tons, total scrap 3,057,000 tons, and pig iron 2,958,000 tons.

² Includes pig iron used for direct castings.

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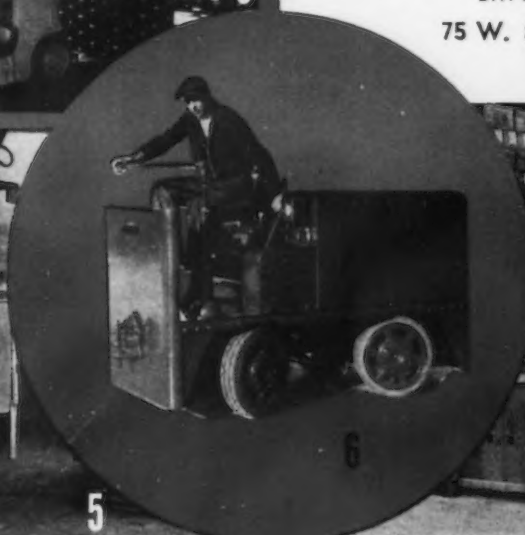
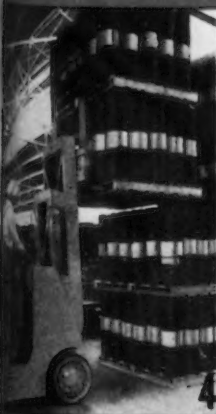
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at air furnaces and 80 per cent of the 1938 tonnage of total scrap used at cupola furnaces is included. Thus, the coverage is relatively higher in the large steel-making areas as compared to other areas in which iron furnaces predominate.

Also, in judging the suppliers' returns, it is pointed out that in some states the per cent of replies received is higher than the average for the United States (44 per cent), while in others it is lower.

The following tables show the re-

ported stocks of iron and steel scrap at consumers' plants and suppliers' yards as of Sept. 30, 1939, and the consumption of scrap and pig iron in September, by states and districts.

Take Over Steel Industry, Congressman Advises U. S.

WASHINGTON—It must be a shock to New Deal economic planners to learn that the iron and steel industry cannot be regulated by the Government. But no less an au-

thority than Representative Usher L. Burdick, Republican of North Dakota, has said as much. So, Mr. Burdick told the People's Lobby Conference here recently, he has introduced a bill for public ownership and operation of the iron and steel industry. It is the same old bill that Mr. Burdick has used as constituency bait for years.

Mr. Burdick said that "United States Steel now owns as much steel producing capacity as its six nearest rivals," and observed that "U. S. Steel and other steel companies can make a profit when operating at two-fifths of capacity."

W. Jett Lauck, CIO economist, gravely informed the Lobbyists that "competitive conditions, so far as possible, had been eliminated, and through inner controls, a policy of restriction had been applied." Mr. Lauck referred to this "restriction" as "monopoly controls."

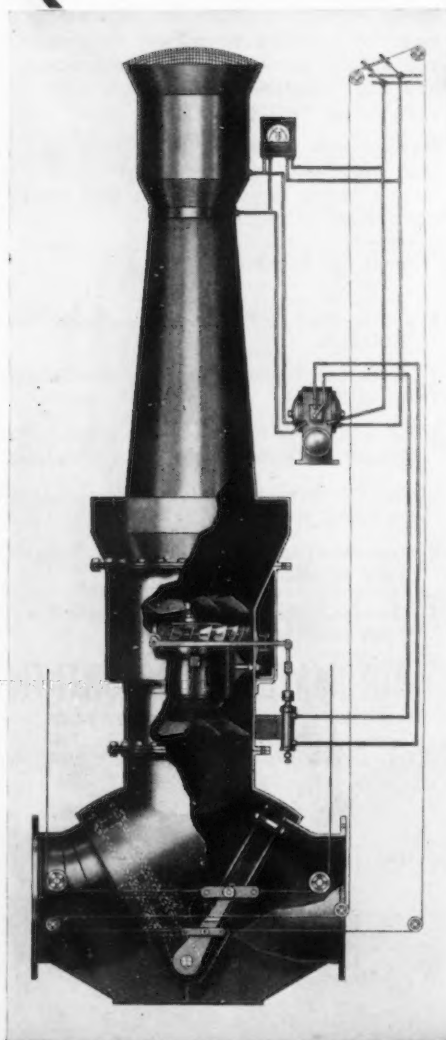
Government Orders

WASHINGTON — Government contracts for iron and steel products, as reported during the week ended Jan. 13 by the Labor Department's Public Contracts Division, totaled \$2,414,682 of which \$1,114,454 represented a War Department order for gun mounts placed with the Baldwin Locomotive Works, Philadelphia. Another War Department contract reported called for an undisclosed number of air cooled engines to cost \$1,066,539, awarded to Continental Motors Corp., Muskegon, Mich. Also reported during the same period were \$328,739 in contracts for non-ferrous metals and alloys and \$771,403 for machinery. Details follow:

Iron and Steel Products

Pollak Mfg. Co., Arlington, N. J., Navy S & A, ammunition boxes..	\$58,865.40
Bethlehem Steel Co., Bethlehem, Pa., Navy S & A, beams	9,225.00
Jessop Steel Co., Washington, Pa., War Air Corps, steel sheets	26,075.96
Elastic Stop Nut Corp., Elizabeth, N. J., War Air Corps, aircraft hardware	11,458.09
Allegheny Ludlum Steel Corp., Watervliet, N. Y., War Ordnance, steel rod	11,700.00
Bethlehem Steel Co., Bethlehem, Pa., War Ordnance, steel rod	11,520.00
Bethlehem Steel Export Corp., New York City, Panama Canal, tracks, anchors	59,000.00
United States Steel Export Co., Washington, D. C., Panama Canal, track materials	110,189.74
Sheffield Steel Corp., Kansas City, Panama Canal, wire nails and brads	17,950.84
The Carpenter Steel Co., Reading, Pa., War Ordnance, steel rod ..	11,700.00
Crucible Steel Co. of America, New York City, War Ordnance, steel rod	11,520.00
American Steel Foundries, Chicago, War Ordnance, steel castings ..	30,169.22
York Safe & Lock Co., York, Pa., War Ordnance, gun mounts	604,188.00
The Baldwin Locomotive Works, Philadelphia, War Ordnance, gun mounts	1,114,454.00
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Lancaster Iron Works, Inc., Lancaster, Pa., War Engineer Corps, steel pipe	17,380.00
Sheffield Steel Corp., Kansas City, War QMC, mesh	13,424.48
Bethlehem Steel Export Corp., New York City, War QMC, reinforcement bars	232,547.90
National Cast Iron Pipe, A Division of James B. Clow & Sons, Kansas City, WPA, cast iron water pipe	11,939.40
Koppers Co., Bartlett Hayward Division, Baltimore, D. C. Navy Yard, couplings and shafts	15,621.65
American Welding Co., New York City, War CWS, steel chemical containers	17,654.00

Non-Ferrous Metals and Alloys

International Nickel Co., Inc., New York City, Portsmouth Navy Yard, nickel-copper-aluminum alloy ..	\$13,078.46
Seovill Mfg. Co., Waterbury, Conn., War Ordnance, brass tubing ..	50,920.00
The American Brass Co., Waterbury, Conn., War Ordnance, copper rotating bands	58,444.60
Standard Pressed Steel Co., Jenkintown, Pa., War Ordnance, components for primers	43,251.56
Wright Machine Co., Worcester, Mass., War Ordnance, body plugs ..	10,399.99
Revere Copper & Brass, Inc., Baltimore Division, Baltimore, War Ordnance, copper rotating bands ..	17,400.00
Seovill Mfg. Co., Waterbury, Conn., War Ordnance, primer bodies ..	122,875.00
The Mattatuck Mfg. Co., Waterbury, Conn., War Ordnance, battery cups	12,370.31
Pyrene Mfg. Co., Newark, N. J., War QMC, fire extinguishers ..	Indefinite
General Fire Truck Corp., Detroit, War QMC, fire extinguishers ..	Indefinite

Machinery

Stone Heating & Ventilating Co., Washington, D. C., Navy S & A, ventilating fans	\$11,292.00
Silent Hoist Winch & Crane Co., Brooklyn, New York, Navy S & A, electric hoists and brakes ..	21,333.00
Gardner-Denver Co., Washington, D. C., Navy S & A, air compressors	14,972.98
The Monarch Machine Tool Co., Sidney, Ohio, Navy S & A, engine lathes	14,600.00
Swind Machinery Co., Philadelphia, Navy S & A, machine, boring, milling and drilling	21,042.00
Milwaukee Electric Tool Corp., Milwaukee, Navy S & A, electric drills	14,208.00
Peter Clark, Inc., New York City, Navy S & A, elevator machinery ..	488,000.00
Levene Motor Co., Philadelphia, Norfolk Navy Yard, diesel engine parts	19,484.00
Florence Pipe Foundry & Machine Co., Philadelphia, War Ordnance, hydraulic valves	27,565.00
The Sidney Machine Tool Co., Sidney, Ohio, War Air Corps, lathes ..	88,140.00
Baldwin-Southwark Corp., Philadelphia, D. C. Navy Yard, overhauling testing machine	14,180.00
Neff Kohlbusch & Bissell, Chicago, War Ordnance, shears	36,587.00

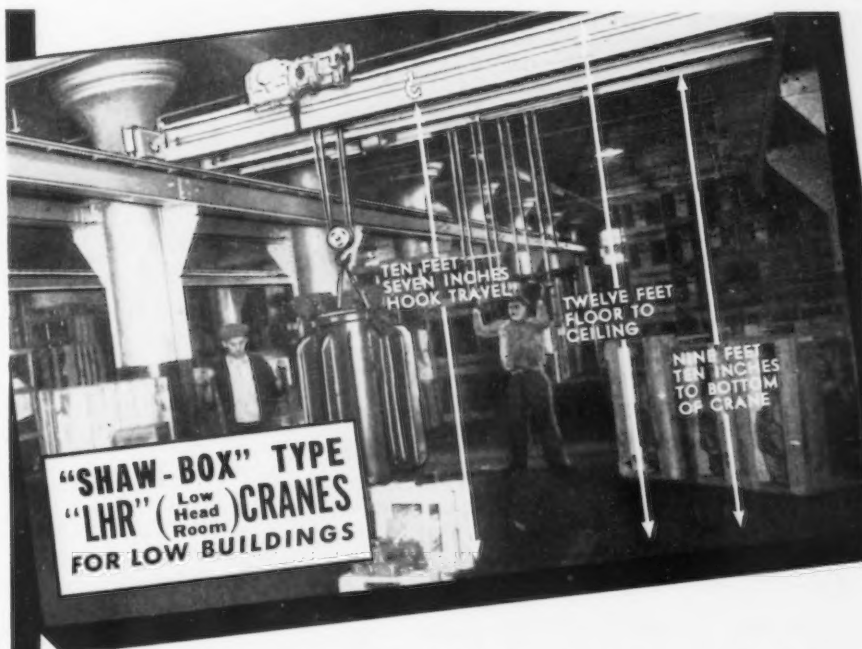
UAW Sole Bargainer With Midland Steel Products

WASHINGTON — After finding that objections to the conduct of the election did not raise any substantial and material issues, the Labor Board has certified UAW-CIO as the sole collective bargaining agency selected by a majority of the production and maintenance employees of Midland Steel Products Co., engaged at the Detroit Pressed Steel Division, Detroit, following a secret ballot election.

The board has announced dismissal of a petition for investigation and certification of representatives filed by Westinghouse Employees Association, Inc., on behalf of employees of Westinghouse Electric & Mfg. Co., Mansfield, Ohio, following an election which resulted in a count of 943 votes for the association to 1445 against. The board said that since results of the election showed that no collective bargaining representative had been selected by a majority of the employees

in the appropriate unit, the petition was ordered dismissed.

The board also announced certification of United Electrical, Radio and Machine Workers of America, Local No. 612, CIO affiliate, as the sole collective bargaining representative selected by a majority of the production and maintenance employees of the Westinghouse company's porcelain division in Derry, Pa., following an election.



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A "Shaw-Box" 3-ton capacity "LHR" Crane (Patented) installed in a building 12 feet high (inside), and 30 feet wide gives a hook lift of 10 ft. 7 inches and makes available more usable space beneath it than any other standard crane . . . This standardized, mass production built, 3-motor crane costs about the same as the average "electric hoist type" crane . . . Included in its modern

design are the advantages of all steel totally enclosed construction; ball bearings throughout; speeds to suit today's tempo; top running trolley; and unusual accessibility of all parts.

Two standardized lines of Low Head Room Cranes, — "LHR" in 1, 2, and 3 tons capacity; and "L" in capacities 3½ to 15 tons . . . Send for dimension tables, descriptions, and illustrations of applications that increase production in limited spaces.



Makers of all types and sizes of Electric and Hand Operated Cranes; "Load Lifter" Electric Hoists; and the famous Portable Electric "Budgit" Hoists . . . Send all your inquiries for cranes and hoists to "Shaw-Box!"

SHAW BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

402 Broadway

MUSKEGON, MICHIGAN

U.S. Merchant Marine Suffers Little So Far from the War

WASHINGTON — Despite restrictions imposed by the neutrality law's combat zones, from which American ships are banned, the American merchant marine was reported this week to be holding its own and carrying almost as much freight in ocean trade routes

as formerly. While the reports were not announced officially by the Maritime Commission and current figures in substantiation were not available, most of the 86 ships regularly in service between this country and Europe were reported to be operating.

There were indications that rerout-

ing of ships to points just outside the European combat zones, or by withdrawal from Atlantic trade routes completely, was responsible for the trend, described by some officials as being much more promising than was expected when the neutrality law was revised early in November. Most of the continued high rate of sailings was attributed to increased activity on Pacific routes.

Some observers pointed out that the reported trend is not difficult to reconcile when consideration is given to Commerce Department reports showing that only 9 per cent of this country's ocean-going tonnage formerly was engaged in trade with European and Mediterranean ports. Mediterranean ports have not been cut off from American ships under the neutrality law. The forbidden area extends from a point south of Bergen, Norway, to the north coast of Spain, including in the restricted area, Ireland, Denmark, Holland, Belgium, Sweden and the Baltic Sea, but exempting the west coast of Spain.

Officially, the Maritime Commission has represented itself as being mildly optimistic over the present outlook. In its annual report submitted to Congress the commission said that despite disturbing factors growing out of the war in Europe, the American merchant marine is in a far better position today than was the case in 1914. It qualified these remarks, however, by warning that extension of the war may cause further dislocations in American shipping.

Characterizing the neutrality law restrictions as striking "most keenly at the ships and men whose employment is jeopardized," Rear Admiral Emory S. Land, commission chairman, told Congress that repercussions may well permeate our national economy. Rate increase, with a consequent increase in cost to the consumer, already has been established in many services, including those not directly affected, he said.

Await War's Effects

The commission specifically declined to submit recommendations for legislative enactment, protesting that "the kaleidoscopic changes in the merchant marine taking place since last September preclude the submission of recommendations until the effects of the European war and the Pittman (neutrality) Act upon shipping can be more accurately appraised."

Although the commission plans to order only nine ships this year—as contrasted with 91 vessels in 1939—at least two will be in the 30,000-ton



Trucks CAN Talk Business!

• Here's the kind of truck-trailer that can give a fast-moving sales talk of its own—and leave a decidedly favorable impression too!

ARMCO PAINTGRIP galvanized sheets for top and body panels help take this motor transport out of the "just-another-trailer" class. That smooth, handsome body finish makes a stand-out advertisement on busy streets and highways.

You may not make or buy trucks, but it may be that you can profit in 1940 by using ARMCO PAINTGRIP in your products. This

paintable galvanized metal has a special bonderized finish that takes paint and helps preserve it. There are no zinc oxides at the surface to dry out paint and rob it of its elasticity. And you save on the finishing costs because acid etching is out.

Whatever you make of sheet metal that has to be painted, you can make better and more salable by using ARMCO PAINTGRIP. Shall we send you more information pertaining to your specific needs? Just address The American Rolling Mill Company, 480 Curtis Street, Middletown, Ohio.



ARMCO PAINTGRIP

class for use in transpacific service. Bids on these are expected to be invited soon. The remaining seven ships may include two additional passenger liners in the same category and five more vessels of a type yet to be determined.

The decision to order only nine ships this year cannot be interpreted as a slackening of pace due to restrictions imposed under the neutrality law because 41 ships of this year's quota already have been contracted for.

Industry Urged to Contact Priority Body on War Orders

WASHINGTON—Machine tool and other manufacturers reluctant to accept large foreign orders without knowing more about national defense needs were advised this week by Captain Henry E. Collins, Director of Treasury Procurement and member of the government priority committee, to communicate with the committee, set up under the Army and Navy Munitions Board.

The agency, also identified as the government clearance committee, and headed by Colonel Charles Hines, was established last summer to reduce conflict between export and import purchases. Its existence was not made public until November, 1939.

The organization, operating mostly under cover, is understood to have inaugurated conferences with representatives of foreign governments and domestic manufacturers soon after the European War broke out.

Unemployment Compensation Law Revised in Wisconsin

MILWAUKEE — Important changes have been made this year in Wisconsin's unemployment compensation law. They include:

Reducing waiting period before the unemployed becomes eligible for benefit payments from three to two weeks. One week's compensation for every three weeks of employment instead of one week for four as previously granted. Statute of limitations for filing claims against employers has been extended from 26 to 68 weeks. Part time workers and other in the lower brackets will be raised to \$6 a week minimum. About 450,000 employees working for some 11,500 state employers are covered by the state unemployment compensation law.

Government Steel Contracts \$120,971,414 in 39 Months

WASHINGTON—Figures just released by the Department of Labor show that since the Walsh-Healey Public Contracts Act became effective in September, 1936, government contracts for iron and steel products totaled \$120,971,414, or

7.93 per cent of the \$1,525,553,836 total for all government contracts of \$10,000 or over.

Purchases of transportation equipment led the list with 1430 contracts totaling \$618,113,058, or 40.5 per cent of the total. Contracts for machinery

*We've brought ALL the controls
TO the operator!*

Convenience—
Less Manipulation—
More Time for Drilling
... That is the basic
principle upon which
Super Service Radials
were designed.

Every movement required of the operator is performed in the shortest distance and with the least effort. Controls are centralized at the Head for all 36 spindle speed changes, for the 18 feed changes, for power column clamping and arm clamping, for arm elevation, power rapid traverse of head, and for all other functions. All controls are low and conveniently arranged, to save time and effort, and to increase your output.



This is only one of the important reasons why Super Service Radials produce "more holes per dollar". Other features are explained in Bulletin R-24. Write for your copy today.



The
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Co.
OAKLEY-CINCINNATI-OHIO-U.S.A.

aggregated \$107,004,452, or 7.01 per cent.

During the same period, the Navy Department placed more contracts than any other single agency, awarding 5297 contracts representing a value of \$706,298,115. The War Department came next with 4949 contracts totaling \$434,563,568. The Treasury Department's Procurement Division, the general purchasing agency for most of the government's non-military products, reported to the Labor De-

partment 5513 contracts covering purchases valued at \$212,701,010, or 13.95 per cent of the total value of all contracts.

Contracts of \$10,000 or over are required to be reported to the Public Contracts Division as having contained stipulations to comply with provisions of the Walsh-Healey Act covering maximum hours, and minimum wages in industries where a minimum wage has been determined by the Secretary of Labor.



An Assist! By ATLAS
View at Prominent Iron Foundry
To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers

CLEVELAND, OHIO

Manufacturers

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SWOC Collectors Picket Carnegie-Illinois Workmen

PITTSBURGH—Slight disorders occurred last week at Duquesne, Pa., when SWOC dues pickets attempted to collect dues from workmen entering Carnegie-Illinois Steel Corp.'s Duquesne plant. "Collectors" demanded to see dues cards from steel workers before allowing them to proceed. However, operations at the Carnegie-Illinois plant were unaffected.

This latest drive followed closely on the heels of a similar one at American Steel & Wire Co.'s Donora, Pa. plant, earlier last week when slight disorder occurred and operations at some of the finishing mills were affected to a small extent.

Illinois Engineering Council to Furnish Technical Speakers

CHICAGO—The Illinois Engineering Council, including 40 representatives from engineering societies in this state, soon will make available a list of speakers to talk upon engineering subjects. Harry McCormack, director, chemical engineering, Armour Institute of Technology, was recently elected president of the council.

Sheet Aluminum Corp. Plans New Strip Mill

DETROIT—Plans for construction of a new strip mill, to be in operation by mid-March, have been announced by George M. Carter, president, Sheet Aluminum Corp., Jackson, Mich. It will cost upward of \$40,000. The new mill will supplement two strip mills now in operation, and will increase the Jackson plant's strip capacity by approximately 35 per cent.

Belt Drive Ratings Revised

MILWAUKEE—Based on studies of belt life made by Allis-Chalmers Mfg. Co. engineers, in conjunction with industry representatives, the power ratings of multiple V-belt drives have been revised to provide maximum belt life. Sheave diameters and correction factors are now standardized according to formulae based on results with multiple V-belt drives over a period of ten years. Overload factors are being arranged also to allow for the type of prime mover and driven machine. The new ratings provide in many cases for a more compact drive and also for the longest belt life at the lowest initial cost.

O'Brien Machinery Co. Celebrates 25th Anniversary

THE O'Brien Machinery Co., 113 North Third Street, Philadelphia, is celebrating the 25th anniversary of its founding by Frank L. and Clarence J. O'Brien, brothers, the present members of the firm.

The business of the company is the supplying of new and rebuilt machinery and equipment for many industries, including boilers, engines, pumps, blowers, fans, electric motors, engine and turbine driven generating sets, power transmission equipment for the steel, electrical and power plant, and machinery for the metal-working trades such as the machine shop, structural shop and pipe shop.

Bethlehem Expands Scarfing, Grinding, Polishing Departments

BETHLEHEM STEEL CO., South Bethlehem, Pa., plans a one-story addition, 200 x 450 ft., on a block of property now being acquired on Second Street, from Northampton Avenue to the New Street bridge, to be equipped for expansion in scarfing, grinding and polishing departments, as well as inspection and other divisions. Extensions will be carried out in the heat-treatment plant, with installation of new furnace units and auxiliary equipment.

1939 Scrap Consumption Listed at 35,000,000 Tons

WITH December consumption estimated at 3,805,000 tons, a slight seasonal decline from November, domestic consumption of iron and steel scrap in steel mills and foundries in 1939 is estimated at 35,006,000 tons by the Institute of Scrap Iron and Steel, Inc. This compares with 21,528,000 tons in 1938 and the record total of 38,006,272 tons in 1937.

Welding Claimed to Lift Ship Earning Power 5%

INCREASE of more than 5 per cent in the earning power of ships has been achieved by welding, according to the welding research committee, Engineering Foundation. By lowering hull weight, welding has brought about an increase of 1000 tons in about 15,000 tons deadweight carrying capacity, the committee reports in a summary of studies related to the American shipbuilding industry.

"The saving in weight," the report states, "has reached about 1000 tons in 6000 tons, which represents about 16 per cent. Approximately 800 tons of this weight decrease may be attributed to the use of welding and 200 tons to the improved machinery weights. The amount due to welding represents about 13 per cent saving in hull weight.

"In other words, this means an increase of 1000 tons in about 15,000 tons deadweight carrying capacity. There is available, then, an increase

of more than 6 per cent in earning power, over 5 per cent of which is a result of welding.

"In addition to possible original savings in cost and increase in deadweight carrying capacity, the use of welding results in an economy in fuel operation. Tests have shown that the completely welded shell, with the elimination of laps, and consequent reduction of resistance, brings about appreciable fuel savings. Further economies are to be found in maintenance, amounting in some instances to 25 per cent."



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A SAVING OF \$1400 IN LUBRICATION COSTS ALONE!
Billet after billet through the blooming mill . . .
not a breakdown in six months . . . average
monthly production more than doubled. Just one
of the many records set in one plant since they
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Developed for heavy duty work . . .
proved under the severest operating
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Write today for full information to

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SUN OILS
PETROLEUM PRODUCTS FOR ALL INDUSTRIES

Hearing Feb. 14 on Rail Employee Wage Minimums

WASHINGTON—The Railroad Industry Committee, appointed under the Fair Labor Standards Act to recommend a minimum wage up to 40c. an hour for railroad employees, will hold public hearings in Washington beginning Feb. 14 to hear testimony from railroad management and labor. In general railroad employees are exempt from the hours limitation

of the law but are covered by the minimum wage provisions. The Labor Department's wage and hour division estimates that some 100,000 of the more than 1,000,000 railroad workers are receiving less than 40c. an hour.

Kelsey-Hayes Vacations

DETROIT — Vacations with pay for approximately 3500 employees of Kelsey-Hayes Wheel Co. were announced recently by George

W. Kennedy, president. The company has also put into effect an efficiency program providing bonuses for hourly-rated employees whose efficiency is above 96 per cent.

Mid-Winter Management Conference Feb. 14-16

THE mid-winter personnel conference of the American Management Association, to be held at the Palmer House, Chicago, Feb. 14 to 16, is expected to draw more than 1000 industrial executives. Planned under direction of J. W. Dietz, personnel relations manager, Western Electric Co., the conference will consist of 11 sessions covering ways of getting management and employees to cooperate in the solution of common problems, training men quickly for skilled jobs, supplementing social security through company pension plans, methods of communicating with employees in multi-unit organizations, psychology in the selection and promotion of employees and instruction of supervisors.

Ayres Sees Fair First Quarter Business

CLEVELAND—Present industrial production levels are so high and existing unfilled orders so considerable that trade and industry can confidently look forward to at least a fairly good first quarter, according to Col. Leonard P. Ayres, vice-president, Cleveland Trust Co., in his January business bulletin. Another encouraging fact is that recent advances in general business activity have been mostly due to increases in the production of durable goods, he said. Among the less favorable conditions in the outlook he cites the fact that the expansion in durable goods output has not been accompanied by any important increase in the issuing of new capital securities, an unusual condition.

Republic Gets Stay In SWOC Strike Case

REPUBLIC STEEL CORP. has obtained from the Circuit Court of Appeals at Philadelphia a stay of execution of an order against it to re-hire 5000 workers who left their jobs in the steel strike of 1937, and to pay back wages, estimated at about \$1,000,000. The company acted to clear the way for an appeal to the Supreme Court. This must be filed before March 1.



FOR more than a third of a century Wyandotte has been manufacturing superior metal cleaning compounds. And from the very beginning our aim has been to provide you with the most efficient metal cleaning for every dollar you spend.

Because of our research, in the laboratory and in the field—Wyandotte quality is higher than ever before. The result is that the cost of using Wyandotte is lower.

Along with Wyandotte products goes Wyandotte service . . . trained metal cleaning specialists are ready to put their time and experience at your disposal without obligation.

Why not write to us today? We will have the Wyandotte Service Representative in your district call on you at once. Together you can work out a metal cleaning schedule that will save you time, money and trouble in 1940.



Canadian Mills Have Large Backlogs

TORONTO — While there has been a slowing down in new business in the iron and steel markets, backlogs are sufficient to enable primary steel producers to maintain almost capacity production for the next six months. Officials of steel companies are optimistic regarding future business. Addressing the purchasing agents of Montreal, H. T. Diplock, vice-president of the Steel Co. of Canada, Ltd., stated, "Canada's steel industry will have all the orders it can handle in 1940, no matter what may happen to the industry in the United States."

Delay in placing large war contracts and other business pertaining to Canada's war effort has resulted in severe criticism of the MacKenzie King Government by the Premier of Ontario and the leader of the Opposition, who tabled a severe rebuke and protest in the Legislature a few days ago. Industrial leaders also are criticizing the policy of the Federal Government in this respect and state that while plants have been equipped at heavy expenditure to handle war contracts such as munitions, shells and guns, no contracts have so far been forthcoming. Premier King so far has failed to reply to this criticism, but stated that an answer would be given in the House of Commons next week. The lack of munitions and gun contracts largely is responsible for the slowing down in operations of secondary plants of the steel industry and is reflected in curtailed operations by many companies in the past few weeks.

New bookings in the steel markets are almost entirely for peace-time production, and it is reported that the automotive industry is responsible for a large part.

Merchant pig iron sales continue draggy and any improvement in this market depends on the awarding of war contracts to augment activities of secondary plants.

SWOC Committee Asks J. & L. For Closed Shop

PITTSBURGH—The questions of union shop and dues check-off at the mills of Jones & Laughlin Steel Corp. arose this week when union mill grievance committees, meeting with company officials, asked that the company grant the union these two concessions. The steel management, it is un-

derstood, declined to negotiate the matter. Under the J. & L. contract with the union, any revision must be sought by the national officers of the SWOC.

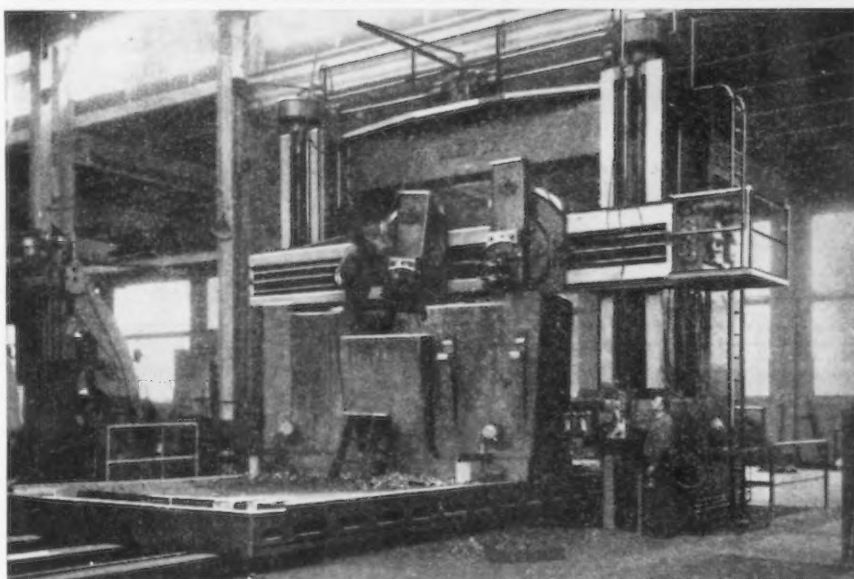
Toledo Still Largest Great Lake Coal Port

TOLEDO—This city continued to hold its record as largest coal-loading port on the Great Lakes. In 1939 the docks here handled 19,900,-

276 tons which was 48 per cent of the total loaded into cargo ships at all points on the lower lakes. In the previous year the five docks here handled only 16,927,910 tons. The Chesapeake & Ohio Railway docks here, with three modern machines, handled 11,151,513 tons for the season's top record.

Meehanite Metal Co. (South Africa) (Pty.), Ltd., Johannesburg, subsidiary of the Meehanite Metal Corp., Pittsburgh, has licensed T. Begbie & Co., Middelburg, Transvaal, South Africa, to manufacture Meehanite castings.

Machining a 130-TON ANVIL



Erie Foundry Company is operating what is believed to be the largest planer in the United States . . . The machine takes work 16 ft. 6 inches between the housings by 14 ft. 3 inches under the rail. This planer enables Erie to effect economies in the machining of parts for large Erie steam drop hammers . . . and to offer its unusual facilities to designers heretofore hampered by existing planer equipment . . . Manufacturers needing the capacity of this big planer are invited to consult with the Erie Foundry Company.



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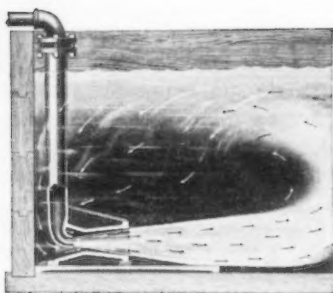
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ERIE BUILDS Dependable HAMMERS

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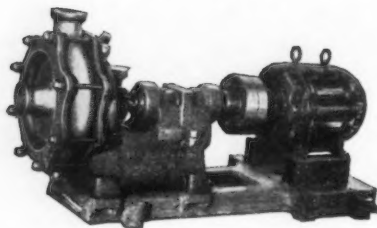
DURIRON STEAM JETS



Duriron Steam Jets are exceptionally resistant to pickle liquor and to the erosive wire-drawing action of steam. And they have additional values: they heat quickly, saving warm-up time . . . improve the cleaning by holding the temperature steady with a minimum of steam consumption . . . circulate the liquor for even distribution of heat . . . eliminate steam hammer.

Send for free Bulletin No. 1801 which contains complete descriptive information.

For Waste Acid Disposal



Duriron Pumps, in capacities up to 2,000 g.p.m., are resistant not only to the pickle liquor, but also to the scale and other solids present.

Acid-handling systems of Duriron pumps, valves, pipe and fittings, for unloading tank cars and pumping the spent liquor to the neutralizing or disposal plant, are economical investments because of the long life and low maintenance costs.

A Duriron Company Engineer will be glad to assist you with your corrosion problems

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438 N. Findlay St.

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Have You a Hot Rolling Problem?

Where careful metallurgical control and skilled work is required on ferrous and non-ferrous alloys—our services can be of real value to you.



We are expertly equipped to hot roll any metal into bars, rods and flats on a contract or toll basis.

We can handle ingots or billets up to about 6" x 6" and hot roll to as small as 1/4" diameter in coils. Also a wide variety of square and flat sizes.

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NEWARK, NEW JERSEY

Melters and Manufacturers of "TOPHET" Resistance Wires—Nickel Chrome Alloys—Copper Nickel Alloys—Pure Nickel and Monel Wire and Strip—Stainless Steel Rods and Wire.

U. S. Warns Exporters Of Rubber and Tin

WASHINGTON—American dealers who export crude rubber and pig tin, strategic war materials, have been warned that unless they voluntarily stop doing so "it will become necessary to use other means to deal with the situation." Threatened action was contained in a joint statement issued by Secretary of the Navy Edison and Assistant Secretary of War Johnson, who charged that exports have reached proportions detrimental to national defense and industry.

The warning came on the heels of sales said to have been made last week to Amtorg, Soviet purchasing agency, which is reported to have exported 1000 tons of pig tin from the United States early this month. Officials said that Amtorg has been trying to buy large quantities of crude rubber, offering premium prices "which many companies have been unable to resist." It was stated that supplies of crude rubber and pig tin are dangerously low with less than a two-month supply of crude rubber.

Midwest Power Conference

CHICAGO—The annual Midwest Power Conference, sponsored by Armour Institute of Technology, in cooperation with seven midwestern universities and the Chicago chapters of various engineering societies, will be held in the Palmer House, April 9 and 10.

General subjects to be discussed at the meeting include gas turbines, small power plants, electrical transmission, power process, fuel problems, and hydro power. Papers will be presented by Parker A. Moe, superintendent of Power, Milwaukee works, International Harvester Co.; Martin Frisch, Foster-Wheeler Corp., New York; James S. Bowman, Tennessee Valley Authority, and E. L. Tindall, Carnegie-Illinois Steel Corp., Chicago.

"Plastics of Today"

ONE HUNDRED members and guests heard F. W. Warner, General Electric Co., Pittsfield, Mass., on "Plastics of Today" at the first 1940 meeting of Elmira, N. Y., Chapter, American Society of Tool Engineers. A sound picture, "Modern Plastics Preferred," was shown in connection with the talk. The next meeting of Elmira Chapter is scheduled for February 16.

FTC Issues Order Against AFL Union in Glass Case

WASHINGTON—The Federal Trade Commission early this week joined the Department of Justice in taking a crack at a national labor union by issuing a cease and desist order prohibiting certain practices which the FTC said tended to hinder and prevent competition in the glazing contracting business in the Indianapolis trade area. Also named as respondents were the Pittsburgh Plate Glass Co., Pittsburgh; Stewart-Carey Glass Co., Indianapolis; the Capital Glass Co., Indianapolis, and officers of the three companies. The labor union involved was the AFL's Brotherhood of Painters, Decorators and Paper Hangers of America.

The FTC complaint in the case was issued in July, 1939, just two months after Assistant Attorney General Thurman Arnold, head of the Justice Department's anti-trust division, announced his department would institute anti-trust proceedings against labor unions. While the first indictment under the Arnold program was obtained in Washington last October, involving an AFL teamsters' union, Department of Justice spokesmen insist that there is nothing new in the attack, pointing out that the first anti-trust case involving a labor group occurred back in 1895 and that since that time as much as 25 per cent of the anti-trust proceedings have been aimed at labor groups.

The respondents in the FTC case were directed to cease and desist from entering into, effectuating, approving or recognizing any agreement, contract, or understanding which contains certain specific requirements as a prerequisite to the right or privilege of any glass distributor or glazing contractor to employ glaziers for the installation of such glass products.

Canada's First War Loan Is Heavily Oversubscribed

TORONTO—Canada's first war loan, which was offered to the public Jan. 15, and on which books closed Jan. 19, was oversubscribed by more than 60 per cent, according to Finance Minister Ralston. The loan sold at par to yield $3\frac{1}{4}$ per cent, was set at \$200,000,000, and subscriptions totalled \$321,276,850. This is Canada's first loan to finance war costs, and it is stated that others will follow as need arises.

Coal Prices Due to Rise 20¢ a Ton in April

WASHINGTON—Coal consumers have about three more months of buying before prices are hiked 20¢ a ton by governmental price fixing decree, it was indicated this

week as the bituminous coal division of the Department of Interior brought hearings on a proposed schedule of minimum coal prices to a close.

George Gorton Machine Co., Racine, Wis., has been reorganized and its capital increased from \$200,000 to \$300,000. The company was formerly a New Jersey corporation and has been reorganized under laws of Wisconsin. New officers are George Gorton, president; George Gorton III, vice-president; C. Erlandson, secretary, and W. B. Tomlinson, treasurer. Directors are George, George, III, James and Charles Gorton and Mr. Tomlinson.



Thomas Strip
COLD ROLLED STRIP STEEL

Accuracy to Specifications is Demonstrated in Office Equipment Parts



Manufacturers of office machines demand cold rolled strip steels that are accurate to gauge and temper, and true to physical properties that give high resistance to wear after heat treatment—steels that are uniform "inch by inch" for the duplication of small but exceedingly important mechanical parts.

For many years, Thomastrip has met the exacting specifications of these important manufacturers. These manufacturers have keen eyes for steel qualities and every facility at their command to determine what steels will perform with greatest economy in their efficient shop practice.

The Thomas organization can capably supply you, too, with cold rolled strip steel to meet exacting requirements.

Steels That Stimulate Progress

THE THOMAS STEEL CO.
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL
WARREN, OHIO

Bright Finish Uncoated, and Electro Coated with Nickel, Zinc, Copper, Brass, Bronze, and Tin

Employers Must Provide Old Age Insurance Receipts

WASHINGTON—The Internal Revenue Bureau, interpreting a new requirement effective Jan. 1 that employers provide their workers with a receipt for taxes deducted from earnings for old age insurance benefits, ruled this week that the statement of amounts deducted may be shown on the pay envelope, on a detachable stub attached to the pay check or on a separate sheet of paper.

War Orders Expected Soon on Larger Scale

OTTAWA—Canadian War Supply Board awarded contracts during the week of a total value of \$1,146,721, Transport Minister Howe announced. Of this total, approximately \$300,000 was for clothing and \$355,000 for foodstuffs. Other orders placed included an order to Consolidated Mining & Smelting Co., Ltd., Montreal, for metals costing \$25,800; Ross Meager, Ltd., Ottawa, received construction contract at Rockcliffe, Ont., at \$62,610; Universal Plumbing & Heating Co., Ltd., Toronto, for equipment for Royal Canadian Air Force, Trenton, Ont., \$22,500; Lundy Fence Co., Ltd., Toronto, for chain-link fence for Trenton, \$92,265. Aircraft supply orders went to R. Mulhall, Ottawa, \$11,925, and Ontario Hughes-Owen Co., Ltd., Ottawa, at

\$8,647. Mechanical transport orders were placed with Ford Motor Co. of Canada, Ltd., Windsor, at \$16,291, and McGill & Moore, Hamilton, Ont., at \$5,118.

Announcement also was made here that the British Air Ministry has placed orders for 850 aircraft and 736 additional airplane motors for use in connection with the British Commonwealth Air Training Plan to be carried out in Canada. This equipment will be paid for by the British Government, and no information was available regarding the value of the contracts or to whom they were awarded.

According to official circles in Ottawa, placing of war orders on a much more extensive scale will commence in the immediate future and contracts will be of a more diversified nature than heretofore. The War Supply Board recently has been placing more orders for the British Government.

Keystone Holds Open House

PEORIA, Ill.—The Keystone Steel & Wire Co. recently held an open house in celebration of the opening of its new office building, which is constructed of steel, brick and glass and is completely air conditioned. This new structure centralizes all of Keystone's administration, general office and trade service departments. Indirect lighting is supplied and the offices are acousti-

cally treated. The building also includes a cafeteria for employees, an executive dining room and a print shop.

The two-story building measures 206 x 58 ft. and was completed on the 50th anniversary of the company's founding. Albert Kahn, Inc., Detroit, acted as architects and engineers.

Steel Makers Oppose Review Of Wage Minimum Decision

WASHINGTON — Characterizing the Walsh-Healey steel wage determination as "devoid of even a plausible economic justification" for the Labor Department's "excursion" beyond its "lawful authority," counsel for the Lukens Steel Co. and six other independent steel mills in the East asked the Supreme Court early this week to deny a further review of the decision of the District of Columbia Court of Appeals.

Last October the court upheld the contention of the seven companies that the Secretary of Labor had gone beyond the scope of her authority in interpreting the word "locality" in the Walsh-Healey Public Contracts Act.

Navy Bureau Awards

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts last week reported contracts awarded to these companies:

George J. Fritz Foundry & Machine Co., St. Louis, cast iron plates, \$73,591; The Watson Machine Co., Paterson, N. J., rope machine, \$7,675; Lloyd & Arms, Inc., Philadelphia, precision lathes, \$7,975; Caswell Strauss & Co., Inc., New York, pig tin, \$92,736; Kearney & Trecker Corp., Milwaukee, milling machines, \$24,463; Electro Metallurgical Sales Corp., ferrosilicon, \$7,961; Hendey Machine Co., Torrington, Conn., tool room lathes, \$8,206; Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, \$25,122.

Correction

THE address of the Pocahontas Iron & Coal Corp., purchasers of the Riddlesburg furnace of the Colonial Iron Co., was incorrectly given in a news item published on page 52 of the Dec. 28, 1939, issue of THE IRON AGE, as 295 Broadway, New York. The correct address is 295 Madison Avenue, New York.



Prices Minor Factor In Demand For Steel, U. S. Steel Tells TNEC

WASHINGTON—United States Steel Corp. this week offered to the Temporary National Economic Committee evidence to show that demand for steel is determined primarily by general business activity, consumers' income and industrial profits, and to only a minor extent by the price of steel.

A statement by Dr. Theodore O. Yntema, University of Chicago, summarized for the TNEC the corporation's studies on the relation of steel prices to steel production and employment.

"The elasticity of demand for steel is so low that a reduction in steel prices does not provide an effective means of increasing production and employment in the industry," Dr. Yntema declared. "Because of this inelastic demand and the character of costs in the industry, a moderate decrease in price results in a great decrease in profits or increase in losses.

Profit Margin Low

"Since margins of profit in the steel industry during the past ten years have been and still are extremely low, no substantial reduction in steel prices could have been borne or could now be borne by the industry without corresponding reductions in costs. This could not be effected without great reductions in wage rates."

The basic questions covered in the corporation's studies were given as follows:

"1. To what extent will the production and sale of steel respond to changes in the price of steel?

"2. To what extent do costs vary with volume of production?

"3. How far, if at all, is it feasible for the steel industry to achieve additional sales, production and employment in depression by reduction of prices? In other words, is it possible for the steel industry to achieve fuller utilization of its productive facilities and thus greater employment by means of price reductions in periods of low demand?"

"An analysis of the evidence avail-

able leads to these conclusions," Dr. Yntema said.

"1. The quantity of steel that can be sold is relatively unresponsive to changes in the level of steel prices. In other words, the demand for steel is inelastic. A reduction in the price of steel, therefore, will bring only a small increase in its consumption. The fluctuations in the production of steel have been due primarily to shifts in demand caused by changes in general business activity, consumers' income and industrial profits. In comparison with these factors, the price of steel has been a minor influence on the quantity of steel sold.

"2. The reduction in average costs resulting from increased output is much less than the reduction in prices which is necessary to induce such increase in output. All but a small percentage of the costs of producing steel, in good times and bad, are cash out-of-pocket expenditures. Unless wages and costs could have been further reduced in depression, a substantially lower price level for steel during the past ten years would have brought general bankruptcy in the industry.

"In view of these facts," Dr. Yntema continued, "full production and employment cannot be maintained in the steel industry during depression by means of reduction in steel prices.

Cyclical Flexibility

"These conclusions are based on the assumption of a reduction only in the price of steel. It has often been pointed out that the inelasticity of demand for individual durable goods does not afford an adequate basis for demonstrating the inelasticity of demand for durable goods in the aggregate. This we recognize. What would happen to production and employment if there were greater cyclical flexibility in the prices of all durable goods is a most difficult and perplexing question. Although we have given the matter much study, we have not been able to reach conclusions which we can establish beyond reasonable doubt. We have found that others better

qualified to deal with this problem have had the same experience, and that there is on the part of many economists honest doubt as to the efficacy of price flexibility as a cure for depressions.

"There is, however, general recognition that the existent inflexibility in costs, particularly in wages, taxes and transportation charges, all of which are subject in greater or less degree to government regulation or influence, is so great as to preclude any considerable increase in the flexibility of the prices of finished products. Unless the costs of producing durable goods are flexible, it is idle to talk of flexibility in their prices."

The Steel corporation studies on which hearings are being held were submitted to the TNEC last November at the previous hearings by Benjamin F. Fairless, president, for examination by the Department of Justice and the Federal Trade Commission. The former department has charge of testimony on prices and costs. The other part of the hearing, expected to begin Thursday, will deal with the basing point system, and will be in charge of Attorney Walter B. Wooden of the FTC.

Dr. Yntema entered the witness stand at the opening of the hearing after Mr. Fairless made a preliminary statement to the committee. He will be called later as a witness. The other Steel corporation witness, who will testify on costs and prices, will be Vice-President Avery C. Adams. It is the expectation that the hearings will be concluded this week, but they may continue into next week.

New Jorgensen Warehouse

EARLE M. JORGENSEN CO., steel distributors, 10510 South Alameda Street, Los Angeles, has completed a new warehouse carrying mild steel bars and shapes, plates, sheets and cold rolled steels, and special tools. The warehouse is at 22nd and Campbell Streets in Oakland, Cal. Other Jorgensen warehouses are at Los Angeles and Houston, Texas.

... THE NEWS IN BRIEF ...

Peak of automobile production probably has been passed for winter season, but spring rise is expected.—Page 46.

Has Congress started a real economy drive? Industry awaits more evidence.—Page 50.

Labor Board had a poor case against us, Armco executive says in a statement issued during House Committee hearing.—Page 52.

USHA building outlay, when housing program is completed, given as \$280,000,000.—Page 53.

W. L. Batt, SKF Industries, succeeds W. Averell Harriman as chairman of Business Advisory Council.—Page 53.

Bureau of Mines issues supplementary report on scrap stocks, showing them by districts as of Sept. 30, 1939.—Page 54.

Government contracts for iron and steel products in week ended Jan. 13, totals \$2,414,682.—Page 56.

Government should take over the steel industry, Congressman tells Peoples' Lobby Conference.—Page 56.

UAW-CIO certified by NLRB as sole bargainer at Midland Steel Products Co. division.—Page 57.

United States merchant marine reported suffering little so far from effects of war.—Page 58.

Exporters urged to contact Government priority committee on large foreign orders.—Page 59.

Government steel contracts since Walsh-Healey Act became effective total \$120,971,414.—Page 59.

Wisconsin's unemployment compensation law is liberalized for workers.—Page 59.

Sheet Aluminum Corp., Jackson, Mich., plans new strip mill to be operating by March 15.—Page 60.

SWOC dues collectors picket workmen at two Carnegie-Illinois Steel Corp. plants.—Page 60.

Belt drive power ratings are revised by study of Allis-Chalmers engineers.—Page 60.

Illinois Engineering Council to make available a list of speakers on technical subjects.—Page 60.

Bethlehem Steel Co. expands scarfing, grinding and polishing departments.—Page 61.

Scrap consumption in U. S. during 1939 estimated at 38,006,272 tons.—Page 61.

Welding has increased earning power of ships 5 per cent, Engineering Foundation committee reports.—Page 61.

O'Brien Machinery Co., Philadelphia, celebrates the 25th anniversary of its founding.—Page 61.

Mid-winter personnel conference of the American Management Association will be held Feb. 14-16 in Chicago.—Page 62.

Republic Steel Corp. gets stay of execution in steel strike case, will appeal to Supreme Court.—Page 62.

Col. Ayres sees "fair" first quarter for business.—Page 62.

Hearing Feb. 14 on rail employee wage minimums.—Page 62.

Vacations, bonuses are planned for employees of Kelsey-Hayes Wheel Co.—Page 62.

Toledo still is largest coal-loading port on Great Lakes; in 1939 docks there handled 19,900,276 tons.—Page 63.

War orders on a larger scale are expected soon in Canada.—Page 66.

Small steel companies oppose review of court decision blocking steel wage minimums.—Page 66.

Employers must provide receipts for old age insurance tax deductions, Internal Revenue Bureau rules.—Page 66.

Navy Bureau announces awards for machine tools, supplies.—Page 66.

Keystone Steel & Wire Co. holds open house at dedication of its new office building.—Page 66.

Prices minor factor in demand for steel, United States Steel Corp. tells TNEC.—Page 67.

R. E. Desvernine sees no substantial war demand for steel for another six months.—Page 74.

International Harvester Co. to adopt profit-sharing plan for employees.—Page 85.

Britain's scrap canvass brings in 80,000 tons in two months.—Page 96.

A 600-page revised edition of the Standard Metal Directory has been published and is available from the publishers.—Page 96.

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MEETINGS

Jan. 22 to 26—International Heating and Ventilating Exposition, Cleveland.

Feb. 5—Engineers Society of Western Pennsylvania, annual banquet, Pittsburgh.

Feb. 8 to 10—Conference of Iron, Steel and Allied Industries, Del Monte, Cal.

Feb. 12 to 15—American Institute of mining and Metallurgical Engineers, annual meeting, New York.

Feb. 14 to 16—Association of Highway Officials of North Atlantic States, Atlantic City, N. J.

Feb. 15 and 16—Wisconsin Chapter, A.F.A., and department of mining and metallurgy, University of Wisconsin, regional conference, Milwaukee.

March 7 to 9—American Society of Tool Engineers, annual meeting, New York.

March 14 and 15—Society of Automotive Engineers, national aeronautic meeting, Washington.

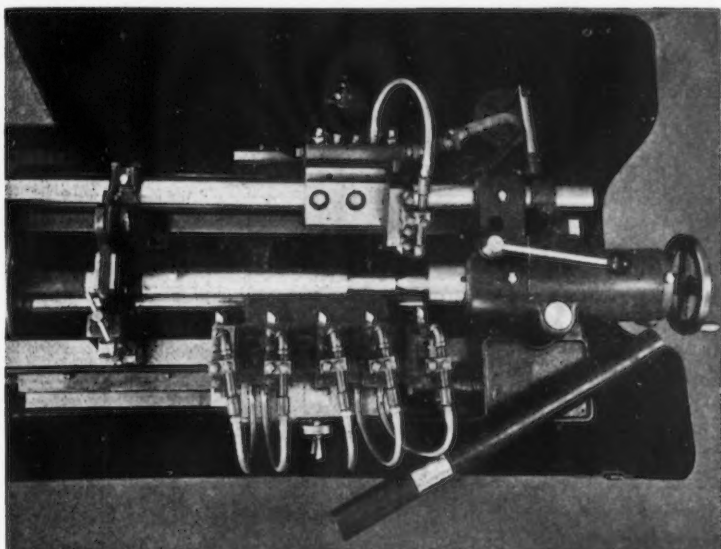
May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 23—American Iron and Steel Institute, spring meeting, New York.

Multiple Cuts *and* Divided Costs

make the FAY AUTOMATIC LATHE *the logical choice to machine work of this kind*

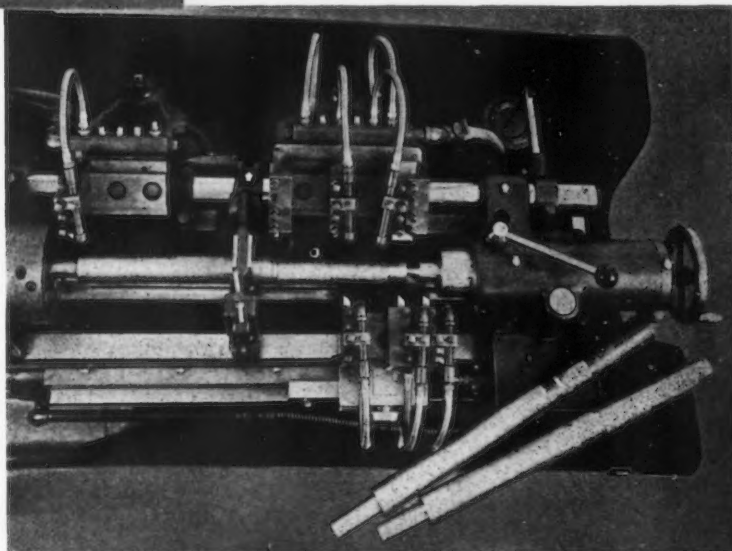


1

Here is a typical example of how Fay Automatic Lathes *increase profits* for their owners. This shaft of Hyten B2 stock 30 x 2½" is machined all over in two 8 x 33" Fay Automatic Lathes. One machine is used for roughing and the other for finishing, with *one man operating both machines*. Using HSS tools, a production of over 20 shafts per hour is maintained, leaving a minimum of stock for finish grinding.

2

The *ease of set-up and simplicity of operation* of the Jones & Lamson 8" Fay Automatic Lathes make it possible to earn mass production profits even on small lots of work. It is *completely automatic* in its cycle, and even more than two machines can be run by one operator where cutting time permits.



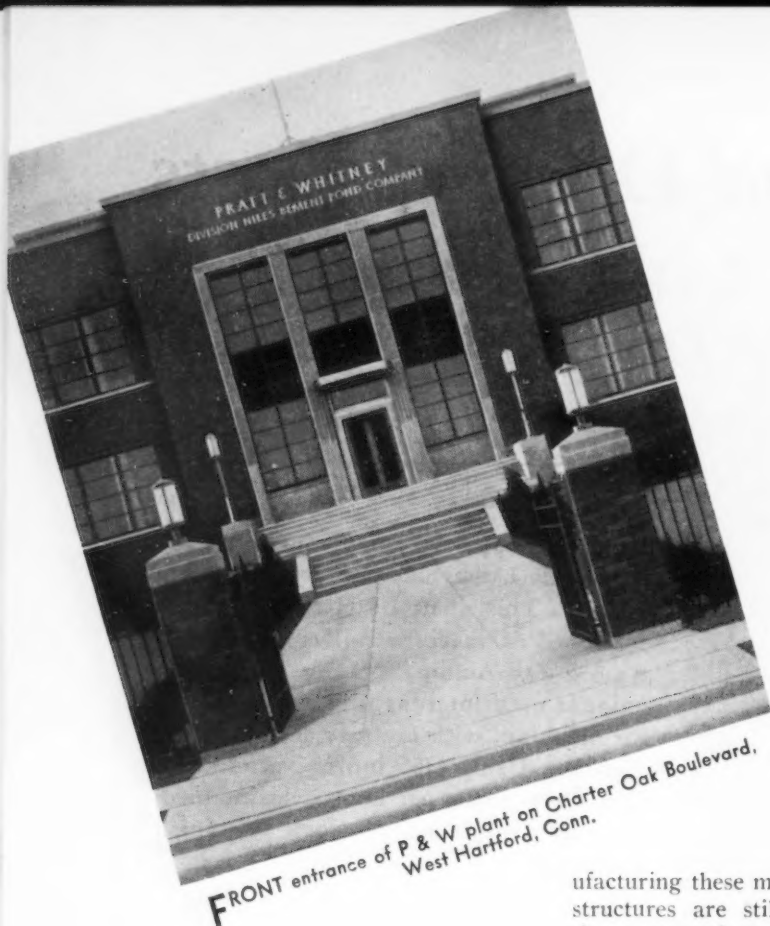
Shafts in *Quantity*, or in *Small Lots*, are machined *Economically, Quickly and Accurately* on Jones & Lamson Fay Automatic Lathes. It should well repay the manufacturer who desires to reduce costs and increase profits to investigate the possibilities of these machines.

A new 16-page *Catalog* describing the construction, operation and attachments of the 8" Jones & Lamson Fay Automatic Lathes is now available upon request.

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: SADDLE & RAM TYPE UNIVERSAL TURRET LATHES... FAY AUTOMATIC LATHES... AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES... AUTOMATIC THREAD GRINDING MACHINES... COMPARATORS... TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS



FRONT entrance of P & W plant on Charter Oak Boulevard, West Hartford, Conn.

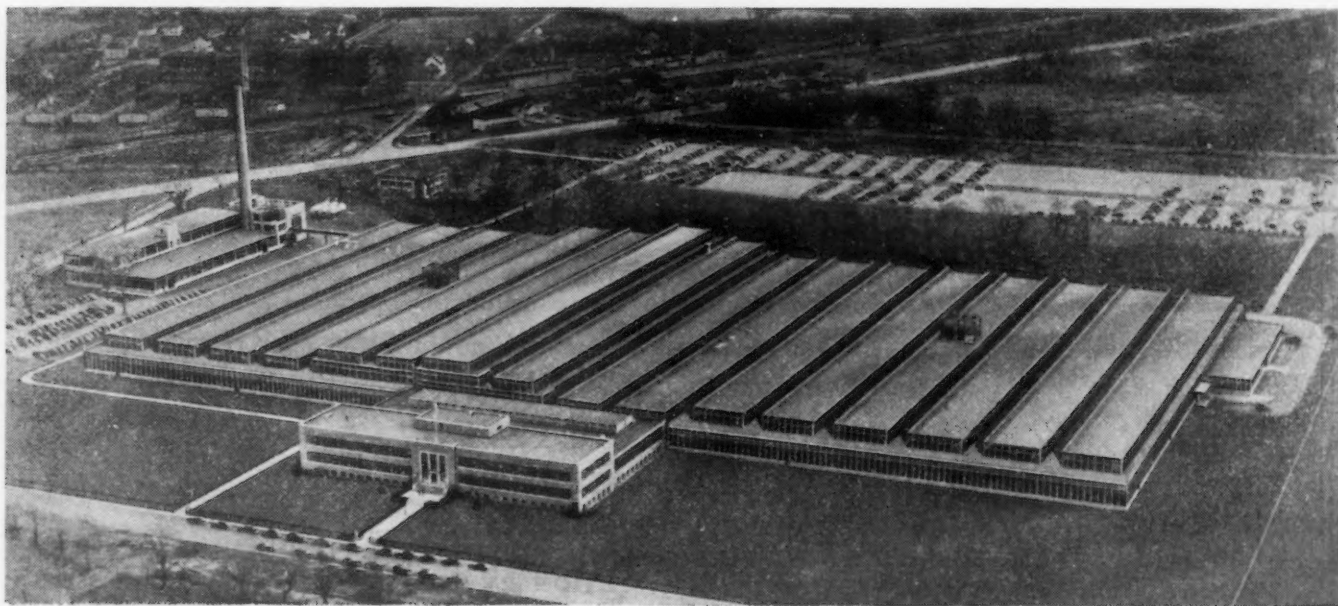
FROM its historic plant comprising 23 multi-story buildings in the city of Hartford, Conn., the Pratt & Whitney division of the Niles-Bement-Pond Co. has moved to its recently-completed, large single-story plant at West Hartford, located on a 120-acre tract of land known as Charter Oak Park, a once famous fair grounds and racetrack.

Pratt & Whitney had been at the old location, near the state capitol, for 79 years. Some of the buildings had been in use since 1865. For light man-

ufacturing these multi-story, separated structures are still suitable, but for the construction of heavy machines they have become inadequate. The many stories and separate buildings presented serious problems in the handling of heavy castings and parts, a condition made worse by the fact that the trend is definitely toward heavier machines. Ten years ago, for example, the heaviest machine built

o o o

ARRANGEMENT of the shop, a one-story structure, the offices and the pattern storage and power house of the new Pratt & Whitney plant may be seen in this airplane view. (Hartford Courant photo.)



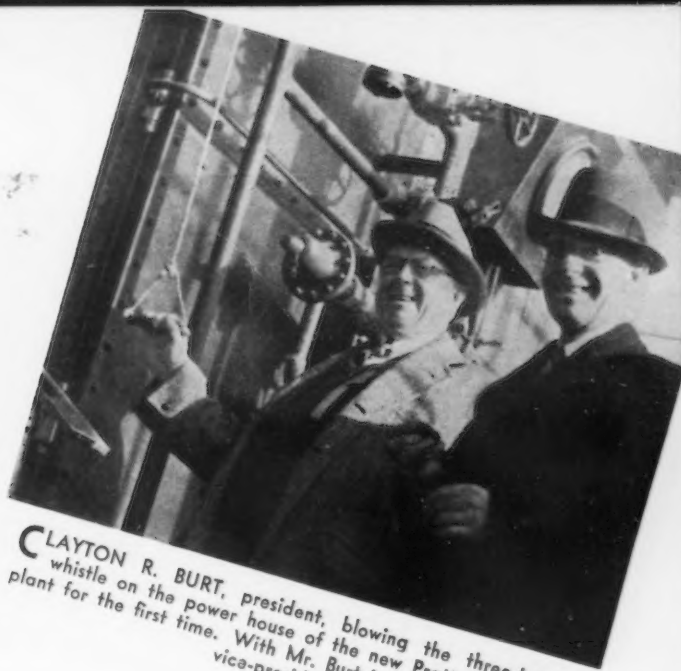
PRATT & STARTS IN NEW

by the company weighed approximately 12,000 lb.; today a machine may weigh as much as 80,000 lb.

The new plant was planned around the exact needs of precision machine tool, small tool and gage manufacture, and the layout is such that parts only have to move a few feet from one job to the next. It is a one-story structure, 1000 ft. long and 550 ft. wide, with a two-story office building and a two-story pattern storage building with garage and heating plant.

Construction of the new plant, the land for which was purchased in 1937, was started in March, 1939. The first unit to be completed was the pattern shop, which was occupied on July 1. Moving of the machine shop itself began on Oct. 9 and was completed during the latter part of November. Moving of the small tool and gage depart-

WHITNEY 80TH YEAR LARGE PLANT



CLAYTON R. BURT, president, blowing the three-toned whistle on the power house of the new Pratt & Whitney plant for the first time. With Mr. Burt is Hubert D. Tanner, vice-president.

ments began Oct. 31. Engineering and general offices followed early in December, and on Dec. 18 Clayton R. Burt, president, officially occupied his new offices, the last man to leave the old plant.

This week, a little more than a month after complete occupation, the new plant is open for inspection: First by the families of the company's 2600 employees, Jan. 22 and 23, and then, Jan. 24, 25 and 26, by the general public, with the plant in full operation and P & W employees acting as guides. In addition, interesting features of the new factory were described to radio listeners on Monday night, Jan. 22, directly from the plant over station WTHT, Hartford. The week's events are not only in the nature of a housewarming, but as this year is the company's 80th anniversary, they are the

first of several events in celebration of it.

Interesting construction features of the new plant include the foundations. Preliminary borings and soil tests showed the need of going down 90 to 100 ft. to reach bedrock. To stand this plant up on piles of that length and be sure that it would stay put was a job that required skilled engineering. A total of 1628 wood piles, averaging

a little better than 90 ft. long, was used. Each was capped with a concrete and steel pile long enough to drive the wood to bedrock and below surface-water level where it will not rot. Laid in straight line, this piling would extend for a distance of 30 miles. It weighed a total of 5075 tons and required 40 cars to deliver it to the job. These piles came from Oregon and necessitated special routing clear across the continent to get their length around existing railroad curves.

The foundations were built on top

o o o
AT night the plant glows with its modern G-E bluish green lighting showing vividly through 110,000 panes of glass—a new air mark for night flying planes.





TYPICAL machine tool assembly floor in the new Pratt & Whitney plant.

of the piles somewhat like bridge girders. They took a total of 18,791 cu. yd. of concrete, weighing 30,419 tons, and 600 tons of reinforcing steel, the whole representing almost 150 carloads of material.

Erection of the structural steel, which was fabricated by the Bethlehem Steel Co., was notably rapid. From special tracks laid into the plant site from the permanent railroad sid-

ing carloads of steel were switched directly to the point of erection. Large tractor cranes picked up the structural members from the cars and swung them into final position with only one handling. Steel workers then fastened them in place, and riveting crews followed up and completed the job. In all there were 3530 tons of structural steel fastened by 371,000 rivets. Steel used for concrete reinforcing, struc-

tural work, roofing, etc., totaled well over 5000 tons.

The roof of the new building was designed not only to carry snow loads, etc., but to resist the upward lift of more pounds per square foot than was exerted by the New England hurricane of September, 1938. It is fire-proof and heavily insulated. More than 670 tons of 18-gage steel were welded in place on the steel girders,

AMPLÉ stocks of steel are carried in these racks, with cut-off machines only a step away and the turning department next in line. Mezzanine toilets such as here shown are provided throughout the shop.



and this covered with a 1-in. layer of cork and $\frac{3}{8}$ in. of roofing felt. As supplied this felt was about $\frac{3}{32}$ in. thick, and was put on in layers to reach a total of $\frac{3}{8}$ in. In all, more than 55 acres of felt, weighing 1568 tons, was used. Roofing pitch—4000 barrels, 600 tons—binds it all together, with a layer of crushed gravel as a top surface. The total weight of roofing material is over 3100 tons.

An impressive feature of the new plant are the acres of glass that form the walls. There are approximately 300,000 sq. ft. of glass, most of it double thick B and A grades. There is also $\frac{1}{8}$ -in. hammered glass, $\frac{1}{4}$ -in. hammered, wire glass, $\frac{1}{8}$ -in. Silverite glass, and polished glass for office windows. To install it 25 to 30 glaziers worked more than six weeks, with five helpers unloading and distributing the 11 carloads on the job. The glass was made by the most modern flat drawn process, the same as used for modern automobile safety glass. It has the characteristic of almost complete distortion elimination, is very white, clear and lustrous, and transmits a greater amount of the shorter ultra-violet rays. The glass is set in steel sash—more than 5 acres of it. The glaziers used 125,000 lb. of steel sash putty. For operating the windows, 21,120 ft. of $\frac{1}{4}$ -in. rods were installed.

Floors are for the most part of creosoted wood blocks laid on edge in tar on a concrete base. Three million of these blocks were used. One section, devoted to fine bench work on gages, is covered with wood strip flooring (natural wood blocks laid on edge without tar). There is 175,000 sq. ft. (45 tons) of this. The floor of another section of the building, used for heavy machine assembly, is solid reinforced concrete, 2 ft. thick. The administration building, made of concrete, is floored with composition tile—34,313 of them, covering 61,000 sq. ft.—laid on the concrete.

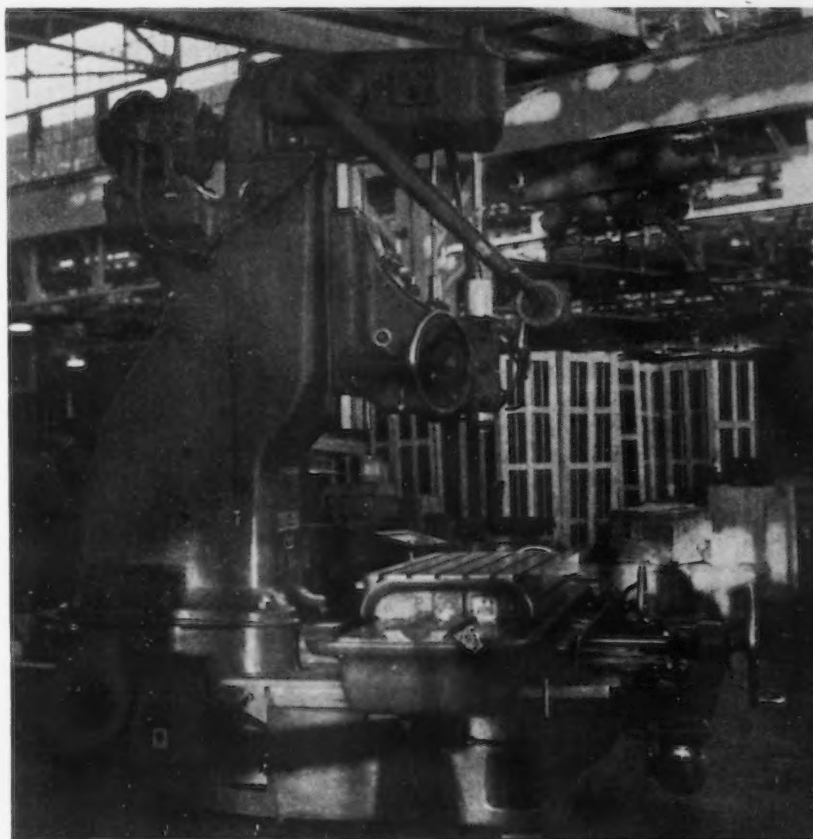
More than 500,000 bricks, 1275 tons, were laid, and an additional 21,000 (radial brick) form the stack, which is 175 ft. high. In addition, 27,000 glazed hollow tile were used in the building.

Other figures showing the scope and size of the job of housing Pratt & Whitney in the new location include 2 acres of 20-gage copper flashing, about 70 tons; more than 10,500 gal. of paint, about 90 per cent of it white, on the inside of the building; 29 miles of electrical conduit; 76 miles of electrical cable and wire; and almost five miles of underground pipe and 16

miles of overhead pipe. The plant is heated by steam through 152 unit heaters and blowers.

The power house or steam plant contains three 400-hp., oil-fired boilers which develop steam at 200-lb. pressure for heating the plant. Fuel oil is stored in three large tanks having a total capacity of 60,000 gal. Compressed air is supplied by two motor-

Moving from the old plant into the new, some $2\frac{1}{2}$ miles across Hartford, was a big job. It was planned months in advance, with machine layouts worked out in complete detail before the new building was ready. When it came time to move, every machine and piece of equipment had been given a number. Chalked on the floor of the new plant were hundreds of rectangles,



THIS jib borer was the first machine to be completed and shipped from the new P & W plant at West Hartford.

driven Ingersoll-Rand two-stage air compressors.

All electric current is purchased. It is led into the plant at 11,000 volts to a complete installation of line switches, metering equipment, reactor unit and distributing switches. There are four transformer stations, located on the roofs of the power house, machine tool manufacturing area, and small tool and gage manufacturing area respectively, and in the basement of the office building. At each of these points the 11,000 volts is transformed into 220 volts, 2 phase, for power, and by separate transformers to 110 volts for lighting. The equipment is arranged so that at some future date it may be changed over to 440 volts, 3 phase, for power purposes. It is estimated that the total occupied load will be 7500 kw., with maximum demand load of 2600 kw. and an average load of 2000 kw.

and in each was the number of the machine that was to occupy that space. Upon arrival at the new plant each piece of equipment was spotted in place according to the chalk marks and immediately the millwrights and electricians went to work to hook them up and get them back into production. The fastest time record was where a grinder operator shut off his machine at 9 a. m. at the old plant and was back in production at 4 p. m. at the new plant. Although most of the machines took longer than this to begin operating again, the average lost time was low. Moving of the equipment was by a fleet of motor trucks.

In all, 950 machines were moved from the machinery department and 1350 from the small tool department. The total weight of manufacturing machines and equipment, machines and tools in process, and the hundreds of

tools, fixtures, furniture, etc., amounted to 23,000 tons. Furthermore, all of it was precision manufacturing equipment and had to be handled with care. With careful planning and packing the job was done with a minimum of lost time and breakage.

In the new plant castings come either by truck or railroad to the unloading dock at the rear, where there is complete crane and other handling facilities. They are then taken to the finishing and cleaning department, which is immediately adjacent, where they are ground, cleaned, filled and painted. Here there is the most modern apparatus, including many spray booths. From there it is only a step to the milling and planing floors where the larger castings receive their initial machining. Then they go a few feet farther to the assembly floors.

Similarly through other sections of the plant small parts of all kinds travel from one job to another until they arrive on the assembly floors. When a machine is finished a big crane moves

it a short distance to the shipping floor where it is boxed and moved outdoors to a truck or railroad car.

In the manufacture of small tools and gages the various operations similarly are "streamlined" from one job to the next, and finished tools go to the stockroom. There is a separate shipping room for the small tools and gages immediately adjacent to this stockroom, and a separate loading platform where express and parcel post trucks come to pick up the lighter articles. Plating departments, hardening rooms, and constant temperature rooms are located at strategic points to eliminate lost motion.

Working conditions for the men are tremendously improved. There is ample light and ventilation, and modern conveniences that permit a man to do his work with maximum physical comfort. Cafeterias serving hot meals at cost have been provided and food trucks are available throughout the plant to give those who require in-between snacks.

... OBITUARY ...

EDWARD E. HUGHES, for 25 years president of the Rail Steel Bar Association, and at the time of his death its president emeritus, died at his home in West Orange, N. J., on Jan. 19, aged 77 years. He was formerly head of the Franklin Steel Co., Franklin, Pa. He became identified with the steel industry after the turn of the century, when he was made receiver for the Franklin Rolling Mills.

♦ ♦ ♦

WILLIAM C. HOOD, general superintendent of the H. C. Frick Coke Co., died at the Uniontown, Pa., hospital on Jan. 22, aged 62 years. He joined the company many years ago as a shipping clerk and from 1917 to 1938 was assistant general superintendent. He became general superintendent early last year.

♦ ♦ ♦

JAMES SKINNER, secretary and a director of the E. W. Bliss Co., Brooklyn, died at his home after a brief illness on Jan. 18, aged 76 years. He joined the company in 1915 as office manager, was made works manager three years later and in 1919 was made secretary.

♦ ♦ ♦

A. WILLIAM ROEHNER, for many years office manager for William G. Wetherall, Baltimore, died of heart disease on Jan. 3. He had been identified with the company for 25 years.

GUY L. SINTZ, actively identified with the development of the gasoline engine throughout his life, died Jan. 18 at his home in Detroit following an illness that began more than 10 years ago. Born in Springfield, Ohio, on April 12, 1875; he had lived in Detroit 17 years and had been employed as factory manager for Claude Sintz, his brother, an automobile parts manufacturer.

♦ ♦ ♦

MAX R. REINHOLD, vice-president and superintendent of Weisel & Co., Inc., Milwaukee, died Jan. 18 in his home in that city after a 10-day illness. He was born in Saxony, Germany, 62 years ago, and went to Milwaukee when he was 12 years of age. He had been with the Weisel firm for 30 years.

♦ ♦ ♦

C. M. ROBERTSON, a salesman for Marshall & Huschart Machinery Co., Chicago, died last week of heart disease, aged 69 years. Mr. Robertson, who had been with Marshall & Huschart for about five years, was associated for the previous 15 years with E. L. Essley Machinery Co., Chicago, as a salesman. Prior to that time he was general superintendent of the old Colburn drill plant at Cleveland, which has since become a part of the Consolidated Machinery Corp.

♦ ♦ ♦

D. CLINTON MCKEE, 51, vice-president in charge of operations for Bes-

semer Limestone & Cement Co., Bessemer, Pa., died suddenly at his home Jan. 8.

♦ ♦ ♦

THOMAS H. HEACOCK, 72, one of the organizers of Superior Sheet Steel Co., Canton, Ohio, died Jan. 8 at his home after a year's illness. He was a native of New York state. When Henry Roemer and other Canton steel leaders formed the Superior Sheet Steel Co., Mr. Heacock joined in the organization and helped supervise construction of the plant. In 1929 he went to Kokomo, Ind., to supervise the work of rebuilding the Continental Steel Co. plant.

♦ ♦ ♦

MANSELL J. PHILLIPS, for many years a designer for Ex-Cell-O Corp., Detroit, died Jan. 10 in a hospital after a short illness. He was born in Detroit in 1898.

♦ ♦ ♦

CHARLES McNICHOLL, former traffic manager, American Bridge Co., Pittsburgh, and former president of the Traffic Club, died Jan. 12 at his home in Pittsburgh.

♦ ♦ ♦

HANS P. JORGENSEN, 71, vice-president of the Jorgensen Engineering Co., Beloit, Wis., died Jan. 6 at a local hospital following an extended illness. Among his survivors is a son, James P., also associated with the engineering company.

War Steel Buying Half Year Away, Desvernine Says

CINCINNATI—Raoul E. Desvernine, president, Crucible Steel Co. of America, said Thursday that the steel industry has received few orders from war-ridden Europe, is not particularly anxious for them and does not expect any substantial war demand to develop for at least another six months.

Stopping here to visit a group of industrialists, while on his way to St. Louis to open a branch office and warehouse, Mr. Desvernine said that business is proceeding cautiously because "there is no profit in war."

The effect of the war so far, he said, was to stimulate domestic orders because of fears of rising prices for steel. Those orders will keep American mills busy until spring, he said, but even then no export business is expected. Mr. Desvernine said he understands that France had ordnance supplies sufficient for 18 months of major war, and he said he assumed that England was equally well prepared.

PERSONALS . . .

GEORGE W. PLAISTED, vice-president of the Austin Co., Cleveland, in charge of West Coast operations for the past seven years, has been named vice-president and general sales manager, with headquarters in Cleveland. A graduate of Worcester Polytechnic Institute, he has been associated with the company since 1916, having joined the Philadelphia office as a structural and reinforced concrete designer. After his return from war service, he was made Northwest district manager and subsequently was appointed regional vice-president and later vice-president.

A. E. PHELPS, who joined the company's engineering force in 1919, has been appointed general purchasing agent. He was district purchasing agent in Cleveland from 1928 to 1931 and from 1937 to the present time. In the interim he held various posts with Austin and other construction organizations, serving as field engineer, construction superintendent and as an engineer at the Austin fabricating division. Mr. Phelps attended the University of Michigan.

♦ ♦ ♦

SIDNEY D. WILLIAMS has been appointed vice-president in charge of sales, of the new steel division at Warren, Ohio, of Copperweld Steel Co., Glassport, Pa. Mr. Williams is a graduate of Lehigh University and from 1913 to 1918 worked in various departments of Carnegie Steel Co.'s Homestead, Pa., works. He later was superintendent of the open hearth department, Central Iron & Steel Co., Harrisburg, Pa., and superintendent of the open hearth department and chief metallurgist of the Pittsburgh Crucible Steel Co., Midland, Pa.

Prior to his present appointment, Mr. Williams, for the past 14 years, has been associated with the Timken Roller Bearing Co., Canton, Ohio, where he was respectively metallurgical sales engineer, assistant director of sales, manager of tube sales and director of sales for the steel and tube division of the company.

♦ ♦ ♦

HAROLD R. SMALLMAN, for many years in charge of the Chicago district office of the Hanson-Van Winkle-Munning Co., Matawan, N. J., has been made Western manager of the company. He joined the A. P. Munning & Co. in 1921, serving that company as a salesman in the Illinois, Indiana and Iowa territories until 1925

when he was moved to the headquarters of the company in Matawan as a sales executive. After the merger of A. P. Munning & Co. with the Hanson-Van Winkle Co. in 1927, Mr. Smallman continued as sales executive for the combined organization. In 1929, he went back to the Middle West as district manager of the Chicago territory.

♦ ♦ ♦

W. BELTRAN DUMONT, formerly vice-president of the Greenfield Tap



GEORGE W. PLAISTED (above), vice-president and general sales manager of the Austin Co., and A. E. Phelps (below), general purchasing agent.



& Die Corp., Greenfield, Mass., has been named vice-president and director of the Threadwell Tap & Die Co., Greenfield, Mass. He has an extended experience of 27 years in the small tool business. Other new directors are PHILIP ROGERS, president of the Millers Falls Co., and GEORGE C. LUNT, treasurer of the Rogers, Lunt & Bowlen Co.

♦ ♦ ♦

ARTHUR NUTT, vice-president in charge of engineering, Wright Aeronautical Corp., Paterson, N. J., has been elected president of the Society of Automotive Engineers. He has been identified with the Curtiss-Wright Corp. and its predecessors for over 23 years.

♦ ♦ ♦

DR. EDWARD RAY WEIDLEIN, director of Mellon Institute, Pittsburgh, will be given the Pittsburgh award of the American Chemical Society in recognition of his high professional achievements as an industrial research director and as a benefactor to chemistry. The award will be made at a dinner on Feb. 15 in the University Club. Dr. Weidlein is a former chairman of the Pittsburgh section and has also served as president of the American Chemical Society.

♦ ♦ ♦

JOSEPH KAYE WOOD is resuming active duty as chief engineer, General Spring Corp., New York, after temporary connection with the Grinnell Co., Inc., Providence, R. I., and the Babcock & Wilcox Co., Ltd., London, England, for a period of three years. During this period he engineered the production, distribution and application of Genspring constant-support pipe hangers used for the suspension of high-temperature pipe lines in oil refineries and steam generating plants.

♦ ♦ ♦

RONALD F. WALKER, formerly sales manager of the Barnes Drill Co., Rockford, Ill., has joined the Wilson-Brown Co., machine tool dealer, New York, which from now on will represent the Barnes company in the metropolitan area. Mr. Walker will cover the northern New Jersey territory for Wilson-Brown.

♦ ♦ ♦

JAMES C. VIGNOS has been made director of research of the Ohio Ferro-Alloys Corp., Canton, Ohio.

♦ ♦ ♦

R. A. CANNON, since 1929 vice-president in charge of casting sales of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been appointed

vice-president in charge of sales. He became identified with the company in 1921.

♦ ♦ ♦

W. W. WILLIAMS, general manager of the Babcock & Wilcox Tube Co., Beaver Falls, Pa., has resigned, effective March 1, to go into business for himself on the Pacific Coast. He first became associated with the company in 1929 as sales counsellor and became in turn general sales manager and general manager of the company. The Eastern climate aggravated a bronchial condition which will necessitate his moving to the Pacific Coast.

♦ ♦ ♦

FRED E. HAKER, who in 1900, at the age of 18, joined the Allis-Chalmers Mfg. Co., Milwaukee, as a stenographer, has been appointed general manager of purchases. When Mr. Haker went to the company 40 years ago he and two other men composed the purchasing department. From his original position he worked into other jobs in the department, becoming assistant manager of purchases in 1916. Mr. Haker was a member of the West Allis school board for 18 years and its president for 12 years. He is now president of the Allis-Chalmers Club and was a director of the Westmoor Country Club.

♦ ♦ ♦

LEO C. PELKUS has been appointed representative in the New England States, with the exception of Connecticut, by the Ajax Electric Co., Philadelphia.

♦ ♦ ♦

C. W. OGDEN, who has been assistant chief engineer since 1922 of the Virginia Bridge Co., Roanoke, Va., has been made chief engineer, effective Feb. 1, succeeding PAUL A. BLACKWELL, who will retire, after having held that post since 1922. W. N. WOODBURY, since 1926 division engineer at Birmingham, will become assistant chief engineer.

♦ ♦ ♦

LOUIS C. MELZOW, formerly superintendent of McCord Radiator & Mfg. Co.'s Detroit plant, has been named assistant works manager with supervision over all branch plants. Mr. Melzow joined McCord in 1909 with long experience in sheet metal fabrication. RAY HAWKINS succeeds Mr. Melzow as superintendent of the McCord Detroit plant.

♦ ♦ ♦

ARTHUR NUTT, president of the Society of Automotive Engineers, will speak before the Milwaukee section of the society on Feb. 5 on "What's



FRED E. HAKER, new general manager of purchases for the Allis-Chalmers Mfg. Co.

Doing in the Air." J. M. MITCHELL, manager of the alloy division metallurgical department, Carnegie-Illinois Steel Co., is leading a discussion on the proper applications of steel.

♦ ♦ ♦

W. J. CROWLEY, formerly with United States Steel Export Co., as branch manager for 16 years, has been appointed general sales manager of



J. G. CARRUTHERS, whose appointment as manager of sales of the tin plate division, Republic Steel Corp., was announced in these columns last week.

Otto Kafka, Inc., New York. Assisting him in charge of the Asiatic and African divisions is R. M. MARSHALL, who was also with the Steel Export company, for over 20 years.

♦ ♦ ♦

WILLIAM S. WOOD and C. E. MACKLEM, have been named to the two new vice-presidencies created by the board of directors of the Beloit (Wis.) Iron Works. Mr. Wood has been associated with the Beloit Iron Works since 1929, and Mr. Macklem since 1921. Both have held executive positions for several years after experience in various departments of the industry.

♦ ♦ ♦

J. F. LINCOLN, president, Lincoln Electric Co., Cleveland, is on an extensive speaking tour, his itinerary covering 12 principal cities in the southern, southwestern and western parts of the country. On Jan. 11 he addressed the Charlotte (N. C.) Engineers Club on "Government Is Made for Man." Mr. Lincoln expected to return to Cleveland by Feb. 17.

♦ ♦ ♦

ARTHUR R. TINNERHOLM, formerly sales manager and factory superintendent of the Specialty Insulation Mfg. Co., Hoosick Falls, N. Y., has been appointed product engineer of the Ft. Wayne plant of the General Electric Co.'s plastics department.

♦ ♦ ♦

OSCAR C. SCHMITT, formerly vice-president in charge of sales of the Emerson Electric Mfg. Co., St. Louis, has been elected executive vice-president. RAYMOND E. OTTO, heretofore manager of motor sales, has been promoted to manager of sales, and WILLIAM R. FRASER, who has been district manager in New York, becomes manager of motor sales, with headquarters in St. Louis. O. D. METZ has been made assistant manager of motor sales.

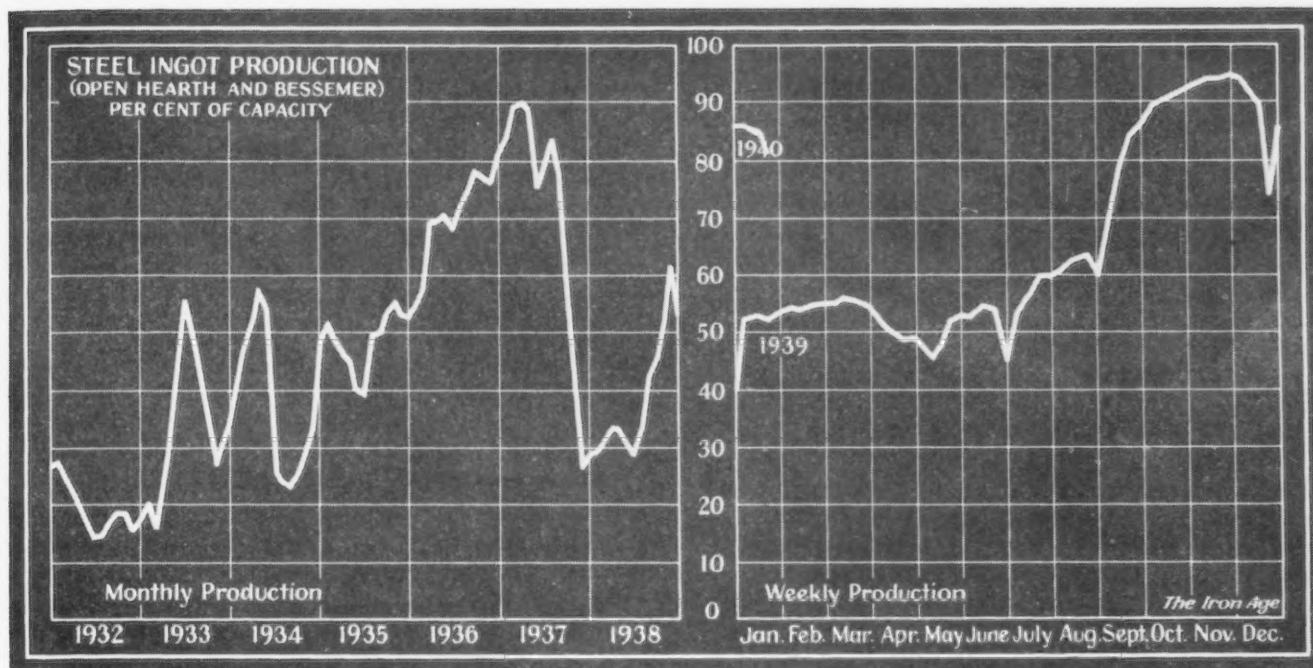
♦ ♦ ♦

ELMER T. RIPLEY, vice-president of Cleveland Quarries Co., Cleveland, has been promoted to executive vice-president, and PAUL A. MORI, formerly works manager of the Amherst, Ohio, plant, has been made vice-president in charge of mechanical operations and properties.

♦ ♦ ♦

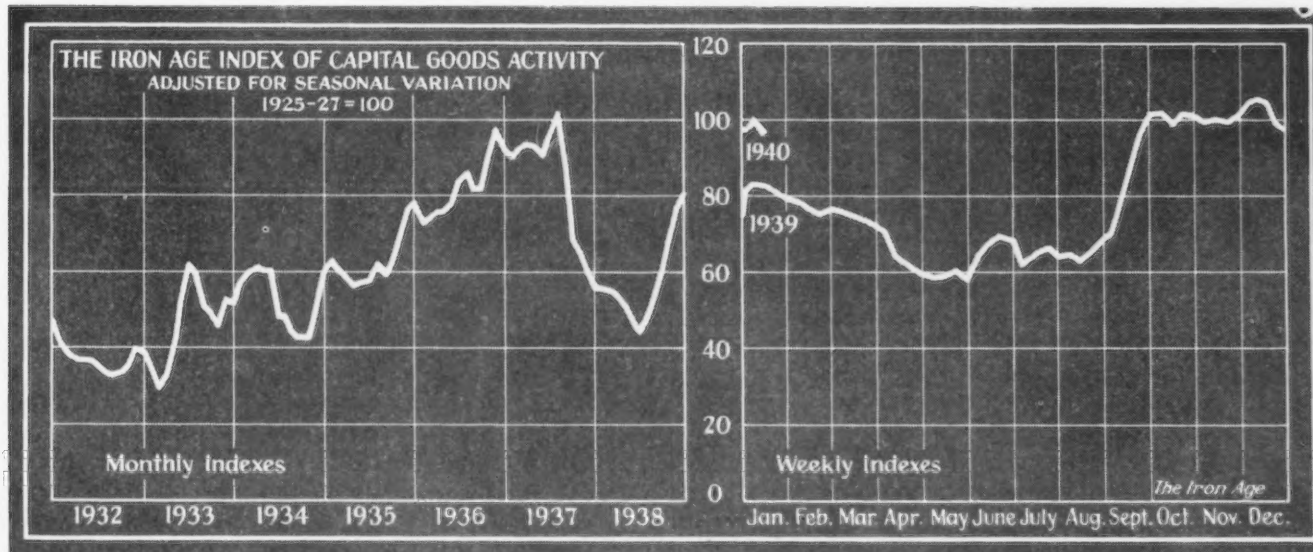
RAYMOND F. HEASLEY, who was superintendent of Crane Co., Cleveland branch, for the last five years, resigned recently and moved to Detroit to take charge of the warehouse of the Edward W. Duffy & Co., 5840 West Jefferson Avenue.

Ingot Rate Drops Three Points to 82% of Capacity



		Pitts- burgh	Chicago	Valleys	Phila- delphia	Cleve- land	Buffalo	Wheel- ing	Detroit	Southern	S. Ohio River	Western St. Louis	East- ern	Aggre- gate	
District Ingot Production, Per Cent of Capacity	CURRENT WEEK..	77.0	90.5	71.0	86.0	74.0	71.5	89.0	94.0	94.0	75.5	85.0	84.5	90.0	82.0
	PREVIOUS WEEK..	83.0	90.5	74.0	86.0	81.0	73.5	89.0	100.0	94.0	75.5	85.0	84.5	90.0	85.0

Capital Goods Production Levels Off



A LEVELING off of operations in the heavy goods industries at a point slightly below the December peaks is indicated by THE IRON AGE index. For the week ended Jan. 20 the combined index number is 97.8, as compared with 100.0 in the week previous and 105.6 in the week of Dec. 16. This latter position was the highest reached since the upswing began last fall. Actual physical output in the past week of the industries covered by the index was little changed from the preceding week, but adjustment for seasonal trends, which at this time of the year are in most cases upward, resulted in losses in the final index number of all components but the lumber carloadings series. According to past experience, lumber carloadings may be expected to continue to gain slowly

for some time as jobbers and builders begin stocking for the usual spring repairing and building activity.

	Week Ended Jan. 20	Week Ended Jan. 13	Comparable Week	
			1939	1929
Steel ingot production ¹	118.8	123.7	85.9	118.7
Automobile production ²	118.0	121.6	98.0	154.0
Construction contracts ³	71.1	72.5	104.8	122.7
Forest products carloadings ⁴	64.8	63.8	56.9	134.7
Production and shipments, Pittsburgh District ⁵	116.3	118.3	71.4	118.6
Combined index	97.8	100.0	83.4	129.7

Sources: ¹ THE IRON AGE; ² Ward's Automotive Reports; ³ Engineering News-Record; ⁴ Association of American Railroads; ⁵ University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ending Jan. 13. Other indexes cover the week of Jan. 20.

... SUMMARY OF THE WEEK ...

... *Ingot production declines to 82 per cent; new business trend not yet apparent.*

° ° °

... *Production hampered by cold weather and ice-bound rivers.*

° ° °

... *Steel scrap lower in most districts; composite declines 13c. to \$17.54.*

UNLESS new steel business comes in soon at a faster rate than has prevailed thus far in January, further curtailment of operations is inevitable. While there are scattered evidences of improvement in some products, nothing resembling an upward trend on a broad scale has yet developed.

This week's ingot production is estimated at 82 per cent of capacity, down three points from last week. Shipments are still heavy and are far exceeding the volume of incoming orders, which range from a probable low point of about 35 per cent of shipments in one important instance to as much as 55 to 60 per cent with other companies. The average is perhaps not far from 50 per cent, which represents a slight overall improvement.

Current production is largely sustained by backlog tonnage carried over from the fourth quarter, but this is rapidly diminishing. In some products, notably plates and shapes, it has declined to the point that prompt shipments are available from a good many mills. On other products deliveries continue to shorten and in most cases do not exceed three or four weeks.

WHILE there has been a seasonal slowing down in consumption of steel by some industries, including the fabrication of structural steel, the automobile industry, barrel and drum manufacturers and tin can manufacturers, there is, on the other hand, steady use by the railroads and railroad equipment builders, the farm implement and tractor industries, shipbuilders and miscellaneous manufacturers. Automobile parts makers are curtailing production in anticipation of a reduced volume of assemblies, but the automobile companies have given indications that they will be in the market next month in preparation for spring manufacturing activity.

Railroad buying programs for 1940 have not been completely formulated and are dependent to some extent on traffic trends. Current orders are relatively small. The Norfolk & Western has ordered 100 box cars and the Northern Pacific will buy seven diesel-electric engines. Small rail orders have been placed by the Reading and Lehigh & New England.

Shipbuilding activity will be increased by the construction of two passenger liners for Pacific service, each to take about 12,000 tons of steel. The Maritime Commission will ask for bids soon.

Although fabricated structural steel lettings are seasonally light, new projects total more than 28,000 tons, including a California bridge calling for more than 17,000 tons. Reinforcing steel awards of 7000 tons are in fair volume for this time of year. New work out for bids totals about 7400 tons.

IN the easier steel situation which now prevails there is sharper price competition for export orders. However, quotations are still generally above domestic levels. The volume of inquiries and orders from abroad has been gradually expanding in the past few weeks.

Price resistance on domestic orders is notably firm. A situation reported from Detroit, where automotive buyers have obtained concessions of \$2 a ton on sheets produced on hand mills, affects only a small percentage of the tonnage used and has been ignored by the larger producers.

Non-ferrous metals, however, have shown marked weakness. Copper was cut \$10 a ton last week, the first price movement since early October. Zinc has declined \$5 a ton, the third price reduction in a month and a half, bringing the current price down to \$20 a ton below that of the fourth quarter peak. Straits tin is at 45c. a lb. compared with a high in September of 75c. and an October high of 55½c.

Scrap markets continue to show a declining trend notwithstanding the fact that snow and cold weather have hampered the gathering and transportation of old material. Prices are lower in several important centers. THE IRON AGE scrap composite price has dropped 13c. to \$17.54, the first change since Dec. 26.

PRODUCTION of steel and pig iron has been hampered by weather conditions in the past week. River shipments of coal, coke, scrap and finished steel have been suspended on the Ohio, Allegheny and Monongahela rivers in the Pittsburgh and nearby districts because of ice, and steel companies' costs have temporarily mounted because of the necessity for resorting to rail shipments. The ice-bound condition of the Ohio river has extended as far down as Louisville, Ky. In northeastern Ohio cold weather caused the diversion of gas to household use to an extent that crippled operations at steel plants and other industrial gas users.

THE Oliver Iron Mining Co., subsidiary of the United States Steel Corp., is completing negotiations for sale of a large tonnage of Lake Superior ore to the Ford Motor Co. at an undisclosed price. Moreover, the Steel corporation has become an active factor in the sale of ore.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Jan. 23, 1940	Jan. 16, 1940	Dec. 26, 1939	Jan. 24, 1939
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:	Jan. 23, 1940	Jan. 16, 1940	Dec. 26, 1939	Jan. 24, 1939
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon, or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.10	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Cents Per Lb.:

	Jan. 23, 1940	Jan. 16, 1940	Dec. 26, 1939	Jan. 24, 1939
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.40	3.40	3.40	3.20
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	\$5.00

†Applies to 80-rod spools only.

Pig Iron

Per Gross Ton:

No. 2 fdy., Philadelphia ...	\$24.84	\$24.84	\$24.84	\$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:

Heavy melting steel, P'gh...	\$18.50	\$18.50	\$18.25	\$15.75
Heavy melting steel, Phila...	17.75	18.00	18.50	15.25
Heavy melting steel, Ch'go...	16.375	16.50	16.25	14.00
Carwheels, Chicago	14.75	15.75	15.75	12.50
Carwheels, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Pittsburgh	18.75	18.75	19.25	15.50
No. 1 cast, Philadelphia	20.25	20.25	20.75	16.75
No. 1 cast, Ch'go (net ton) ..	14.25	14.25	14.25	12.75

Coke, Connellsville

Per Net Ton at Oven:

Furnace coke, prompt	\$4.00	\$4.00	\$5.00	\$3.75
Foundry coke, prompt	5.50	5.50	5.75	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:

Copper, Electrolytic, Conn...	12.00	12.50	12.50	11.25
Copper, Lake, New York ...	12.00	12.50	12.50	11.375
Tin (Straits), New York ...	45.00	47.00	50.25	46.25
Zinc, East St. Louis	5.50	5.75	6.00	4.50
Zinc, New York	5.89	6.14	6.39	4.89
Lead, St. Louis	5.35	5.35	5.35	4.60
Lead, New York	5.50	5.50	5.50	4.75
Antimony (Asiatic), N. Y...	16.50	16.50	16.50	14.00

The Iron Age Composite Prices

Finished Steel

Jan. 23, 1940	2.261c. a Lb.
One week ago	2.261
One month ago	2.261
One year ago	2.286

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

	High	Low
1939.....	2.286c., Jan. 3	2.236c., May 16
1938.....	2.512c., May 17	2.211c., Oct. 18
1937.....	2.512c., Mar. 9	2.249c., Jan. 4
1936.....	2.249c., Dec. 28	2.016c., Mar. 10
1935.....	2.062c., Oct. 1	2.056c., Jan. 8
1934.....	2.118c., Apr. 24	1.945c., Jan. 2
1933.....	1.953c., Oct. 3	1.792c., May 2
1932.....	1.915c., Sept. 6	1.870c., Mar. 15
1931.....	1.981c., Jan. 13	1.883c., Dec. 29
1930.....	2.192c., Jan. 7	1.962c., Dec. 9
1929.....	2.236c., May 28	2.192c., Oct. 29
1928.....	2.192c., Dec. 11	2.131c., Jan. 3

Pig Iron

\$22.61 a Gross Ton
22.61
20.61

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

High		Low	
\$22.61, Sept. 19	19	\$20.61, Sept. 12	12
23.25, June 21	21	19.61, July 6	6
23.25, Mar. 9	9	20.25, Feb. 16	16
19.73, Nov. 24	24	18.73, Aug. 11	11
18.84, Nov. 5	5	17.83, May 14	14
17.90, May 1	1	16.90, Jan. 27	27
16.90, Dec. 5	5	13.56, Jan. 3	3
14.81, Jan. 5	5	13.56, Dec. 6	6
15.90, Jan. 6	6	14.79, Dec. 15	15
18.21, Jan. 7	7	15.90, Dec. 16	16
18.71, May 14	14	18.21, Dec. 17	17
18.59, Nov. 27	27	17.04, July 24	24

Steel Scrap

\$17.54 a Gross Ton
17.67
17.67
15.00

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH		LOW	
\$22.50, Oct.	3	\$14.08, May	16
15.00, Nov.	22	11.00, June	7
21.92, Mar.	30	12.92, Nov.	10
17.75, Dec.	21	12.67, June	9
13.42, Dec.	10	10.33, Apr.	29
13.00, Mar.	13	9.50, Sept.	25
12.25, Aug.	8	6.75, Jan.	3
8.50, Jan.	12	6.43, July	5
11.33, Jan.	6	8.50, Dec.	29
15.00, Feb.	18	11.25, Dec.	9
17.58, Jan.	29	14.08, Dec.	3
16.50, Dec.	31	13.08, July	9

THIS WEEK'S MARKET NEWS

OPERATIONS

... Rate for industry drops three points to 82% ... Pittsburgh off

THIS week's estimate of steel ingot production is 82 per cent, down three points from last week. The sharpest drop is in the PITTSBURGH district, which is down six points to 77 per cent. Although the CLEVELAND-LORAIN district is down seven points, the PITTSBURGH decline represents a larger capacity. The YOUNGSTOWN district has declined three points to 71 per cent. Declines have also occurred at BUFFALO and DETROIT.

The necessity for diverting gas into household consumption slowed activity at many northeastern Ohio industrial and steel plants starting Jan. 19, but milder weather has eased this situation.

Furnace repairs at two DETROIT plants have caused a temporary recession in activity there from 100 per cent to 94 per cent.

NEW BUSINESS

... No new trend has yet developed ... weather affects activities

Ice-bound conditions on the Ohio, Allegheny and Monongahela Rivers have seriously hampered the transportation of finished steel products, coal, coke and scrap in the PITTSBURGH and nearby districts. Shipping on the Ohio and Allegheny Rivers in that area has been suspended for the past week and remained in that condition on Tuesday of this week. A few cases of coal transportation on the Monongahela River have been reported but conditions are daily becoming extremely difficult, with costs mounting rapidly. As a result of this condition, some steel companies have already made arrangements to move coal from captive mines by rail in case shipping is completely suspended on the Monongahela River. Coal supplies at steel mills appear to be adequate for the time being but a continuation of present weather could change this picture considerably. Relatively milder weather has dispelled some of the pessimism in shipping circles there, although no movement of goods down the Ohio River from Pittsburgh or to this point is expected in the very near future. The serious condition on the Ohio River, which has affected shipments

of finished steel products, coal and scrap, extends as far down as Hunt-ington, Cincinnati and Louisville.

Total steel specifications at PITTSBURGH in the past week changed but little from the week before and the incoming rate approximates 50 per cent of steel ingot capacity. Steel producers have made an appreciable dent in backlogs since the first of the year and as long as new business continues at current levels, further reduction will be made as shipments are being maintained at a high rate. Some improvement in sales has been noted for semi-finished steel, wire and wire products, and tubular goods. Export inquiries and demand remain an important factor in the current steel picture. Steel producers are still of the opinion that a moderate upturn in new business will materialize by mid-February.

Although operations at CHICAGO mills are at near capacity rates, the volume of new business continues at the sharply lower levels first experienced a few weeks ago. It is becoming obvious that several mills there will be forced to curtail operations unless orders increase soon to a considerable extent. Aside from rails, bars, cold rolled, light hot rolled and galvanized sheets, backlogs are not large. Structural shapes, plates and tin plate are available from nearly all mills in short order. It is generally thought that bookings will go no lower. In one CHICAGO sales office, tonnage to date in January is about on a par with the previous month.

Export orders are contributing some to the total of new business from day to day, but this tonnage, in the Middle West at least, is not expected to assume considerable proportions unless hostilities abroad develop much more seriously than at present. CHICAGO sheet producers are not looking for important buys from Detroit for several weeks. Most of the major consumers in that area appear to be living off inventories built up during the last quarter of 1939. Actual production on their part has not slumped as drastically as the rate of new orders would indicate. It is believed, however, that they, too, are still working largely on orders booked before Jan. 1, and that their operations will not be maintained unless additional business is obtained shortly. Farm equipment prospects are fairly good, and production of farm tractors and implements continues at a high rate.

Steel orders continued to improve modestly the past week at CLEVELAND and YOUNGSTOWN, part of the support coming from the automotive industry, which is expected to be in the market even more heavily between now and Feb. 10. Fair demand for wire, alloy steel and tubular goods is reported. Export inquiries for pig iron from southern European nations and Sweden are more numerous. Production and sales of domestic consumer goods remain gratifying.

Reports from ST. LOUIS are that agricultural implement plants in the triticities of Illinois are operating at a heavy rate, including night shifts, with farm tractors as the principal item in production. At Peoria, war orders for tractor trench-digging machines help to swell the domestic business.

There was a slight increase in both new orders and inquiries in PHILADELPHIA in the past week. The bulk of this increase is traceable to efforts of small consumers to round out inventories. Tonnage per order was very small. Delivery periods on most products are on a normal basis, but in several directions sheet and strip shipments are still extended somewhat. A fair tonnage of export business from Scandinavian countries was booked by EASTERN PENNSYLVANIA plate producers during the past week.

Although pending tonnage indicates continued brisk activity in fabricated and reinforcing steel on the PACIFIC COAST, price weakness appears to be developing in both fields. Some seasonal weakness usually appears at this time due to efforts by Eastern fabricators to book tonnage in that temperate area because of slowing down of Eastern construction activities, but much of the present weakness appears to come from intense competition among Pacific coast concerns. Most fabricated steel business is being booked by the larger organizations.

PRICES

... Mills resisting efforts of buyer for concessions

OCCASIONAL rumors of weakness in a few products are heard, but when investigated prove to be lacking confirmation. Attempts to secure lower prices have been made by a few consumers, but resistance by steel sellers is notable.

PIG IRON

... Export inquiries increase; domestic buying tapers

FORWARD buying continues light, with domestic sales continuing downward. Export inquiries during the past week have increased, although there has been no gain in the volume of orders actually placed from abroad.

Releases on new business at PITTSBURGH continue dull, still being influenced by year-end factors. CLEVELAND reports that the melt as indicated by foundry coke shipments is better than pig iron deliveries show. With the amount of pig iron held by melters plus the iron on order there is a disposition to refrain from buying until the outlook for the spring is clarified. A marked increase in export inquiries from Sweden, Holland, Hungary and Italy has been noted in the past 10 days. In a number of these export inquiries duplication is reported.

January shipments at CHICAGO are from 20 to 25 per cent under a month ago, but coke movement is running slightly ahead of December, indicating that CHICAGO district foundries are operating on the excess pig iron ordered in the last quarter of 1939. Producers' order books are still well filled, but most of this tonnage will have been shipped by April 1. A fair tonnage of \$23 iron is being sold. Estimates now available of second quarter activity indicate that a reduction of nearly 25 per cent from first quarter is expected, largely because of seasonal factors. Last week Interlake Iron Co. banked two of its blast furnaces in CHICAGO, three of its seven stacks there continuing in blast.

Pig iron sellers in the NEW YORK area report a falling off in domestic business, with little prospect for much improvement at least until March. A high light in the export business during the past week has been the flow of inquiries from Sweden. Shipments from furnaces continue in good volume while backlogs, although still fairly substantial, are declining.

There is no perceptible change in the general situation at BOSTON. While there is practically no new business, shipments on old orders are quite satisfactory to furnace representatives. New England foundries continue to operate 80 to 85 per cent of rated capacity, which means that a buying of pig iron movement is brought just so much nearer each day. Prices are holding.

Foundry operations in the PHILADELPHIA area are well maintained and iron shipments are showing some expansion as the inventory influence wears off. New orders are still limited to occasional prompt carlots, most consumers having sufficient supplies on order to last well into February. Export sales are negligible.

First quarter ordering of pig iron in the SOUTHERN OHIO area, is without interesting features. A few contracts have been signed and others are being reported as fourth quarter commitments become exhausted. The melt continues to be at about 65 per cent of foundry capacity with machine tool plants most active. Automotive demand continues to be off slightly, while the stove, furnace and agricultural foundries are without any great demand.

BUFFALO producers are not alarmed over the current lull in activity, looking upon it as fairly normal and expecting it to continue for some six or eight weeks. If a little smaller, foundry heats are steady and operations run to five days a week. Inventories are not large.

Shipments in the ST. LOUIS area are estimated to be 15 per cent below the corresponding period in December, due to a general drop in consumption, except in steel and agricultural implement production.

STRUCTURAL STEEL

... New projects heavier but outlook generally is poor

FABRICATED structural steel lettings dropped to 10,450 tons from 13,625 tons a week ago. Outstanding awards are 3000 tons at Jacksonville, Fla., for the Main Street bridge over the St. John's River; 1500 tons for Lowry Field hangar and annexes, Denver; 1100 tons for Navy magazines at Hawthorne, Nev., and 1100 tons for a bridge in Woodward County, Okla.

New structural steel projects had a sharp advance to 28,250 tons, as against 4600 tons in the previous week and include 17,110 tons for the Pit River bridge at Redding, Cal., a Central Valley project, on which bids are in; 4500 tons for the first unit of a War Department building in Washington; 1500 tons for the Dookers Hollow bridge, Bessemer, Pa., and 1200 tons for a power station at Terre Haute, Ind., for the Dresser Power Corp., on which bids are in.

Among 16,750 tons of plates is 12,000 tons for welded steel pipe for the Department of Water and Power, Los Angeles.

Though a few important jobs have closed in the Middle West, the overall outlook is no better. Incoming business has actually decreased, in spite of the recent awards. Activity of fabricating shops is little changed from a month ago, but prospects indicate that a downward trend may soon be started.

American Bridge Co. was low bidder on the 17,000-ton Pit River bridge for the Bureau of Reclamation's Central Valley project. The bridge company's unit bid for furnishing and erecting 2,940,000 lb. of carbon steel was \$0.0615 per lb.; the bridge company offered to furnish and erect 10,710,000 lb. of carbon steel for \$0.064 per lb. and 19,540,000 lb. of silicon steel for \$0.0716 per lb. Total bids submitted were: American Bridge Co., \$2,588,354 with structural steel to be shipped from Gary, Ind.; and Bethlehem Steel Co., \$2,750,321, with structural steel to be shipped from Chicago.

Building conditions in New England are such that the New England Structural Co., Everett, Mass., is retiring from business, and disposing of its equipment and other assets. The company is one of the oldest of its kind in Massachusetts, having been established in 1898. The largest remaining fabricators in Eastern New England include the Lyons Iron Works, Manchester, N. H., and the Haarmann Steel Co., Holyoke, Mass. Providence, R. I., has two concerns but they are not strictly fabricators, having entered into other lines of work.

SHEETS AND STRIP

... Current buying is light but gain is expected in February

FRESH sheet and strip business at PITTSBURGH in the past week again declined and orders so far this month are considerably less than the volume booked in the same period a month ago. Current specifications can be classified as "odds and ends" but most producers look for a pick up in automobile and miscellaneous buying sometime in February. Although producers have made considerable headway in reducing unfilled tonnage, backlogs still are substantial. Deliveries are becoming easier, however, with most mills able to furnish prompt service on cold rolled sheets.

Automotive specifications have been

heavier recently for CLEVELAND and YOUNGSTOWN flat rolled producers. Two independent automobile manufacturers distributed business, one placing orders with hand mills after reportedly seeking a concession of \$2 a ton on hot rolled sheets. Capacity of hot mills remains fully engaged for weeks ahead, but the pressure for deliveries has slackened, enabling schedules to be rearranged.

RAILROAD BUYING

... Some orders placed for cars, engines, rails

NORFOLK & WESTERN has purchased 100 automobile box cars from Greenville Steel Car Co. and Northern Pacific will buy shortly, as part of its 1940 equipment program, seven diesel-electric switching locomotives. Chicago, Milwaukee, St. Paul & Pacific is planning to air condition 25 passenger cars at its West Milwaukee shops at an estimated cost of \$300,000 and the Southern is planning to modernize 14 passenger coaches at a cost of \$275,000. Wheeling & Lake Erie is building four switching locomotives in its own shops.

The Interstate Commerce Commission has granted approval to General American Transportation Corp. and American Car & Foundry Co. to construct 75 tank cars by fusion welding for experimental service in transporting caustic soda solution and petroleum products. American Car & Foundry Co. was given an additional permit, in conjunction with E. I. du Pont de Nemours & Co., to build 36 tank cars for experimental service carrying various corrosive materials.

Reading has purchased 4000 tons of rails, dividing the order between Bethlehem Steel Co. and Carnegie-Illinois Steel Corp. Lehigh & New England has ordered 590 tons of rails from Carnegie-Illinois Steel Corp. and 500 tons from Bethlehem Steel Co.

Keeshin Freight Lines, Chicago, plans to spend \$1,500,000 in the next three years replacing equipment, \$200,000 of which will be spent at once for 200 new trailers.

... PLATES ...

... New orders very light ... Competition for export business sharper

NEW business in plates is very light, one result of which is keener competition for export orders. Eastern mills are able to make very

prompt deliveries, in some instances in the same week as the order is received. In CHICAGO plates are obtainable in from two to three weeks.

Standard Oil Co. of Ohio has awarded the construction of three Ohio River barges to Dravo Corp., Pittsburgh. About 650 tons of plates and shapes are involved.

The Los Angeles Department of Water and Power awarded approximately 12,000 tons of large diameter welded steel pipe to Western Pipe & Steel Co. This department will take bids shortly on additional large quantities of 86 in., 120 in. and 132 in. pipe. Consolidated Steel Corp., Los Angeles, will construct a wind tunnel at Moffett Field near Sunnydale, Cal., requiring approximately 2100 tons.

TUBULAR GOODS

... Sales holding at steady and satisfactory level

TUBULAR sales at PITTSBURGH in the past week compared favorably with bookings of a month ago. Although export business continues as a factor, domestic consumption of oil country goods is proceeding at a slightly higher level. Standard pipe demand is substantially unchanged from recent activity.

CLEVELAND and YOUNGSTOWN producers appear to be well satisfied with the amount of new business that has developed so far this year and predict an active spring. Standard Oil of Ohio has been releasing line pipe for projects in Ohio and Illinois while a number of Western lines of varying lengths are in the pending stage.

MERCHANT BARS

... Demand is better than for most other products

THE volume of fresh hot rolled bar sales at PITTSBURGH continues at a rate under that of a month ago and producers have made a considerable dent in backlogs. Bar demand, however, still stands out when compared with current requirements for other steel products.

Specifications at CLEVELAND and YOUNGSTOWN were light last week, yet sellers remain firm in the belief that the recession will end soon. Small mills' backlogs remain extended. The pressure for deliveries has eased, making shipping promises better because schedules can be shifted more readily than at any time since Sept. 2.

Next to sheets, bars are the most popular item at CHICAGO mills at present. Delivery from some producers in a few weeks' time is not difficult, but others are booked through February, and even further on some sizes. The farm equipment industry, makers of auto parts, jobbers, cold drawers and forgers are the main support of the bar mills in this vicinity.

SEMI-FINISHED STEEL

... Specifications have expanded at expense of backlogs

PARTLY because of the poor showing several weeks ago, semi-finished specifications at PITTSBURGH have expanded in the past week. A considerable reduction has been made in unfilled tonnage volume since the peak recorded in late November.

CLEVELAND reports rod capacity still heavily booked but relaxation of pressure for deliveries is making schedules more flexible and resulting in acceptance of moderate new business.

BOLTS, NUTS AND RIVETS

... Improvement seen in orders and inquiries

ORDERS and releases have improved in the last few days, leading to the belief on the part of producers that the low point of the temporary recession has been passed and that from now on continued improvement will be shown. Good-sized orders from DETROIT are expected before Feb. 1, although they will not be as large or spectacular as those placed last fall. New business from the railroads is light at present but agricultural implement manufacturers are very active.

SHIPBUILDING

... Bids to be taken soon on two large liners

MARITIME Commission officials said this week that they hoped to advertise for bids sometime before Feb. 1 for the construction of two 35,000-ton luxury liners for transpacific service. While it is understood that final plans have not been completed, officials confirm reports that the ships will be designed so as to be readily converted into aircraft carriers. Steel requirements for these two vessels are estimated to be in excess of 12,000 tons each.

REINFORCING BARS

... Awards total 7000 tons and inquiries 7435 tons

REINFORCING steel awards call for 7000 tons, including 2500 tons for the Sunnydale housing project at San Francisco, and 1400 tons for the James Baxter housing project, Newark, N. J.

New reinforcing inquiries total 7435 tons and include no job of more than 900 tons.

The Boston Metropolitan District Commission has let a contract for sewerage designs to a Chicago and two Boston engineering concerns. Preliminary designs will be for a \$10,000,000 sewerage project to end pollution of Boston Harbor. The project when completed will cost \$25,000,000 and will be the largest thing of its kind ever built in Massachusetts.

One or two isolated soft spots in the price structure have occurred recently but so far are not representative of the general situation.

WIRE PRODUCTS

... Discounts on 19 and 20 gage poultry netting revised

DISCOUNTS on 19 and 20 gage poultry netting to jobbers in straight carloads have been revised from 45 to 43 per cent, with mixed carloads and less carloads similarly changed, while the discount to retail dealers for straight or mixed carloads goes from 35 to 33 per cent. CLEVELAND reports the likelihood of several changes in merchant wire products, one being revision of columns on 7, 9 and 11 gage woven wire fence, which situation was incorrectly reported here last week, the changes mentioned in the report having actually been put through previously.

Wire sales, including wire rod, manufacturers' wire and merchant wire specifications, have increased

moderately at PITTSBURGH the past 10 days. Although bookings so far this month are less than the volume placed during the same number of days in December, the gap between the two periods is not as great as it was a week ago. Jobbers are placing merchant wire specifications in preparation for regular spring demand.

CHICAGO wire sellers report a fair volume of incoming business but well under the levels attained during the last quarter of 1939. Industrial buying is of major importance currently, orders from the rural areas not ordinarily becoming a large factor in total sales until late February and March. Backlogs are being worked down at a rapid rate.

TIN PLATE

... Operations remain at 70%; specifications gain slightly

TIN plate operations this week are unchanged at 70 per cent. With a moderate increase in incoming specifications recently, no further drop in operations of important proportions is expected in the near future. Following the canners' convention, being held at CHICAGO this week, steel producers expect to have a better idea of spring requirements. Export inquiries and orders remain a factor in the current volume of new business.

IRON ORE

... U. S. Steel subsidiary reported selling to Ford

THE U. S. Steel Corp., through its ore mining subsidiary, is completing negotiations for the sale of a substantial tonnage of iron ore to the Ford Motor Co., Detroit. The price paid was undisclosed. U. S. Steel Corp. has entered the market and is now advertising the sale of iron ore on long or short term contracts. This action is unusual when compared with the corporation's past performance with re-

gard to ore. It is believed that one of the factors bringing about the entrance of the corporation into the ore market is the company's attempt to avoid taxable stocks of iron ore.

An advertisement in the latest *Skills Mining Review* brought the Oliver Iron Mining Co.'s entry into the open market before the public.

The advertisement stated that the company, subsidiary of United States Steel Corp., will sell Mesabi ore on long or short term contracts. Appearance of the advertisement created a sensation in ore mining offices. Principal operations of the company are on the Mesabi range, site of the famed Hull Rust mine, world's largest open pit mine. The company also is a strong shipper from the Vermilion range. In the past, the company has traded ore when necessary to balance the analysis of other ore mining companies, but outright sales have been cleaned out, principally for inventory purposes.

The Oliver company's Mesabi ores are all very good from the analysis standpoint. The analysis is identified by groups rather than by individual mines.

Ford Motor Co. is one of the most active independent buyers in the ore market each year. Ford in recent years has bought requirements outright or traded ore. At one time Ford owned one or two mines.

Consumption of Lake Superior iron ores rose in December to 5,538,374 gross tons, the best mark for any month since August, 1929, according to the Lake Superior Iron Ore Association.

December consumption brought the 1939 total to 44,361,289 gross tons compared with 25,703,050 tons in 1938.

Stocks of ore at furnaces and lower Lake docks on Jan. 1 totaled 35,439,773 tons, against 34,578,849 a year before. On Dec. 31 the number of furnaces depending on Northern ore was down two from Nov. 30 to 155 out of a total of 189.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Jan. 23, 1940	Jan. 16, 1940	Dec. 26, 1939	Jan. 24, 1939	1940	1939
Fabricated structural steel awards	10,450	13,625	12,100	21,800	43,700	99,900
Fabricated plate awards	16,750	120	1,730	2,175	21,200	13,520
Steel sheet piling awards	0	250	200	2,175	350	3,710
Reinforcing bar awards	7,000	1,365	5,900	10,500	24,415	41,905
Total Letting of Construction Steel..	34,200	15,360	19,930	36,650	89,665	159,035

FABRICATED STEEL

... Lettings drop to 10,450 tons from 13,625 tons last week

... New projects in good volume at 28,250 tons as against 4600 tons a week ago ... Plate awards total 16,750 tons.

NORTH ATLANTIC STATES AWARDS

- 230 Tons, Augusta, Me., Kennebec Pulp & Paper Co. unit, to Lyons Iron Works, Manchester, N. H.
- 185 Tons, Midland, Pa., extension to open-hearth building for Pittsburgh Crucible Steel Co., to Pittsburgh Bridge & Iron Co., Pittsburgh.
- 125 Tons, Collingswood, N. J., Cooper River State bridge, to Bethlehem Steel Co., Bethlehem, Pa.
- 105 Tons, Albany County, N. Y., State Highway bridge WPSO-SS 39-25 to Lackawanna Steel Construction Corp., Buffalo.

SOUTH AND SOUTHWEST

- 3000 Tons, Jacksonville, Fla., Main Street bridge, St. John's River, to Mount Vernon Bridge Co., Mount Vernon, Ohio.
- 1100 Tons, Woodward County, Okla., bridge FAP-324-B(1) to Capital Iron & Steel Co., Oklahoma City, Okla.
- 110 Tons, Dallas County, Tex., bridge FAP-22 to Austin Brothers, Dallas, Tex.
- Unstated tonnage, Rutledge, Tex., gate frame tracks for Marshall Ford Dam, to American Bridge Co., Pittsburgh.

CENTRAL STATES

- 734 Tons, Edwards County, Ill., State bridge, to Joseph T. Ryerson & Son, Inc., Chicago.
- 275 Tons, unnamed location, bridge No. 511-A for Atchison, Topeka & Santa Fe Railroad Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 240 Tons, St. Louis, Lerner Dress Shops building to Ingalls Iron Works Co., Birmingham.
- 169 Tons, Perry County, Ill., state bridge, to Fort Pitt Bridge Works Co., Canonsburg, Pa.
- 160 Tons, Appleton, Wis., rebuilding upper dam, to Wisconsin Bridge & Iron Co., Milwaukee.
- 147 Tons, State of Iowa, three bridges, to Clinton Bridge Works, Clinton, Iowa.
- 141 Tons, Lombard, Ill., State bridge, to American Bridge Co., Pittsburgh.
- 130 Tons, Warren, Ohio, overhead crane runway for Republic Steel Corp., to American Bridge Co.
- 110 Tons, State of Iowa, three bridges, to Des Moines Steel Co., Des Moines.

WESTERN STATES

- 1500 Tons, Denver, Lowry Field hangars and annexes, to Bethlehem Steel Co., Bethlehem, Pa.
- 1100 Tons, Hawthorne, Nev., Navy magazines (Specification 9396), to Bethlehem Steel Co., Los Angeles, through William P. Neil Co., Los Angeles, contractor.
- 400 Tons, Burbank, Cal., Lockheed aircraft assembly building No. 6, to Bethlehem Steel Co., Los Angeles.
- 185 Tons, Earp, Cal., Parker Dam power house tunnel supports (Specification 874), to Southwest Welding & Mfg. Co., Alhambra, Cal., through Clyde W. Wood, Los Angeles, contractor.
- 172 Tons, Weed, Cal., overhead crossing, to Judson-Pacific Co., San Francisco, through F. Fredenburg, South San Francisco, contractor.
- 110 Tons, San Francisco, warehouse, to Western Iron Works, San Francisco.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 4500 Tons, Washington, first unit, War Department building.

- 1500 Tons, Bessemer, Pa., Dookers Hollow bridge, Allegheny County.
- 200 Tons, Cohoes, N. Y., plant addition for Mohawk Paper Mills, Inc.
- 165 Tons, Niagara Falls, N. Y., manufacturing building for American Sales Book Co.; bids in.
- 165 Tons, Passaic, N. J., Julius Forstmann library.
- 160 Tons, Pittsburgh, city playground building.
- 150 Tons, North Bethlehem Township, Pa., State overpass.
- 112 Tons, Woodbridge, N. J., contract No. 6, Thomas A. Edison Bridge over Raritan River.
- 100 Tons, Weston, Mass., Charles River shaft for Metropolitan Water Commission.

CENTRAL STATES

- 1200 Tons, Terre Haute, Ind., power station for Dresser Power Corp.; bids in.
- 290 Tons, Battle Creek, Mich., State bridges.
- 205 Tons, Tama, Iowa, bridge No. 410 for Chicago & North Western Railroad Co.

REINFORCING STEEL

... Awards of 7000 tons; 7435 tons in new projects

ATLANTIC STATES AWARDS

- 1400 Tons, Newark, N. J., James Baxter housing project, to Bethlehem Steel Co., Bethlehem, Pa.; Frank Briscoe Co., contractor
- 275 Tons, Bedford County, Pa., highway project, to Bethlehem Steel Co., Bethlehem, Pa.

SOUTH AND CENTRAL

- 667 Tons, Chicago, subway, section D-6-B, to Inland Steel Co., Chicago; Minder Construction Co., contractor.
- 150 Tons, Paducah, Ky., Thomas Jefferson housing project, to Laclede Steel Co., St. Louis; through George W. Katterjohn, contractor.
- 140 Tons, Paducah, Ky., Abe Lincoln housing project, to Laclede Steel Co. through McCarthy Construction Co., contractor.
- 120 Tons, Minneapolis, Procurement invitation No. 21441, to Truscon Steel Co., Youngstown.
- 112 Tons, Rantoul, Ill., hangar and school building, to Bethlehem Steel Co., Bethlehem, Pa.

WESTERN STATES

- 2500 Tons, San Francisco, Sunnydale housing project, to Gilmore Fabricators, Inc., San Francisco, through Barrett & Hilp, San Francisco, contractor.
- 774 Tons, Hawthorne, Nev., Navy magazines (Specifications 9396), to Truscon Steel Co., Youngstown, Ohio, through William P. Neil Co., Los Angeles, contractor.
- 532 Tons, San Diego, Cal., Washington Street bridge, to Blue Diamond Corp., Los Angeles, through Contracting Engineers, Los Angeles, contractor.
- 213 Tons, Los Angeles, bridges over Arroyo Seco near Marmion Way, to Trojan Steel Co., Los Angeles, through Oberg Brothers, Los Angeles, contractors.
- 103 Tons, Alameda, Cal., public works shop and other building at Naval Air Base, to Truscon Steel Co., San Francisco, through Peter Sartorie, San Francisco, contractor.

- 175 Tons, Chicago, two river pier crusses, State Street bridge; bids Jan. 26.
- 165 Tons, Youngstown, Ohio, municipal airport hangar for U. S. Treasury Dept.
- 110 Tons, Ames, Iowa, women's gymnasium for Iowa State College.

WESTERN STATES

- 17,110 Tons, Redding, Cal., Pit River Bridge, Central Valley project (Specification 885); American Bridge Co., Pittsburgh, low bidder.
- 975 Tons, Scotia, Cal., Eel River bridge; bids Feb. 14.
- 595 Tons, Los Angeles, Arroyo Seco bridge and railroad undercrossing; bids Feb. 8.
- 141 Tons, Seattle, Wash., three girder spans; bids in.
- 125 Tons, Denver, building for W. T. Grant Co.; bids in.
- 110 Tons, Rigby, Idaho, State underpass.

FABRICATED PLATES

AWARDS

- 12,000 Tons, Los Angeles, welded steel pipe for Department of Water and Power, to Western Pipe & Steel Co., Los Angeles.
- 2100 Tons, Moffett Field, Cal., wind tunnel for Army aeronautics laboratory, to Consolidated Steel Co., Los Angeles.
- 2000 Tons, Gravel Switch, Ky., upper and lower lock gates, Kentucky Dam, for TVA, to American Bridge Co., Pittsburgh.
- 650 Tons, Three Ohio River barges for Standard Oil Co. of Ohio, to Dravo Corp., Pittsburgh (includes shapes).

SHEET PILING

PENDING PROJECTS

- 900 Tons, Chicago, Calumet Park breakwater; bids in March to Chicago Park District.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 400 Tons, Woodbridge, N. J., Thomas A. Edison bridge over Raritan River, route 35; contract No. 6.
- 400 Tons, New York, substructure, East River housing project; bids Feb. 1.
- 300 Tons, McKees Rocks, Pa., housing project; W. F. Trimble & Sons, low bidders.
- 200 Tons, Providence, R. I., Narragansett Electric Co. building.
- 200 Tons, Union County, N. J., mostly mesh, widening route No. 29, sections 3B, 1C and 2C.
- 125 Tons, Providence, R. I., Rhode Island School of Design auditorium and class rooms.
- 100 Tons, Essex and Morris Counties, N. J., mostly mesh, highway project, route No. 6, sections 11B and 12A.
- 100 Tons, Fort Monmouth, N. J., Signal Corps laboratory.

CENTRAL STATES

- 600 Tons, Clinton, Iowa, DuPont Co. power house.
- 300 Tons, Dayton, Ohio, wind tunnels, Wright Field; bids Jan. 25.
- 175 Tons, Toledo, Ohio, housing project; J. H. Berkbile, low bidder.
- 171 Tons, Saginaw, Mich., F. W. Woolworth Co. store, Paugh & Brown, Cleveland, general contractors (85 tons reinforcing bars; 86 tons joist).

WESTERN STATES

- 900 Tons, Sawtelle, Cal., veterans' buildings; Robert E. McKee, contractor.
- 900 Tons, Los Angeles, Ramona housing project; Baruch Corp., Los Angeles, contractor.
- 650 Tons, Los Angeles, Los Angeles River improvements, section II; bids Feb. 16.
- 630 Tons, Los Angeles, Caluenga Boulevard improvement; J. E. Haddock, Ltd., Pasadena, Cal., low bidder on general contract.
- 420 Tons, Los Angeles, Cal., Maravilla housing project; B. O. Larson, Los Angeles, low bidder on general contract.
- 360 Tons, Santa Barbara, Cal., industrial education unit at Santa Barbara State College; bids in.
- 340 Tons, Scotia, Cal., Eel River Bridge; bids Feb. 14.
- 162 Tons, Los Angeles, Cal., Woodrow Wilson School; bids in.

... NON-FERROUS ...

... Copper cut to 12c., Valley ... Spelter reduced \$5 a ton to 5.89c., New York ... December lead shipments were 44,881 tons; production 45,615 tons ... Price changes make buyers more hesitant.

NEW YORK, Jan. 22—Culminating an extended period of poor buying, copper prices were cut \$10 a ton in the past week and spelter was reduced \$5 a ton. The copper reduction was not wholly unexpected as weakness had been evident in dealings on the commodity exchange, the open market and the export market for the three and four days preceding the cut. On Wednesday several small producers offered copper at 12.25c. per lb., Connecticut Valley, and a leading custom smelter met this

level on Thursday. The producers, meanwhile continued to quote 12.50c. Then on Monday a smelter lowered its price to 12c. and before the end of the day all the producers had lowered their quotations to this level. This series of price changes naturally killed whatever consumer interest might have been developing and buyers have adopted a policy of waiting until some indication of the future course of the market becomes available. Export interest was rather light all week and quotations on prompt shipment today were

down to a range of 11.60c. to 11.70c., f.a.s., as compared with 12.30c. to 12.40c. a week ago. Quotations on copper and brass fabricated products have been revised to conform with the new primary copper price.

Zinc

Following one of the duller weeks the trade has experienced in some time, quotations were cut \$5 a ton Monday by a custom interest to a basis of 5.89c. per lb., New York. This is the third price reduction since the early part of December, 1939, and the new price is \$20 a ton below the price prevailing during the buying wave of the last quarter of 1939. There was a slight improvement in buying following the price cut, but the volume is still sharply below the rate of shipments. Prime Western sales in the past week were 1235 tons and shipments were 4861 tons. These compare with 676 tons sold and 5008 tons shipped in the preceding week.

Lead

Total sales in the past week were, in keeping with the weakness in the other non-ferrous markets, very light, but toward the end of the week interest in February positions showed signs of reviving. As February needs so far are only 40 to 45 per cent covered, there remain some substantial tonnages of February metal yet to be purchased. Shipments of lead in December were 44,881 tons, well up to previous expectations, and shipments were 45,615 tons. This practical balancing of production and shipments leaves stocks little changed from the preceding month at 58,077 tons. While statistically, the lead market is in a very strong position, it remains to be seen whether it can overcome the depressing influence of the price reductions in the other non-ferrous markets. Quotations are unchanged at 5.50c. per lb., New York.

Tin

The lack of demand in face of a continued heavy influx of material from the Straits forced prices down further in the past week. Prompt Straits today is priced at 45c. per lb., New York, as compared with 47.25c. a week ago. Up to the 20th of this month, shipments from the Straits to the United States were 11,000 tons, while a conservative trade estimate places current consumption at roughly 7000 tons a month. The embargo on shipments from Great Britain is resulting in the building up of large stocks there. While this situation will undoubtedly be ironed out soon, it nevertheless has a depressing influence on London prices.

Harvester Profit-Sharing

CHICAGO—International Harvester Co. will shortly adopt a profit-sharing plan for its 60,000 employees.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Jan. 17	Jan. 18	Jan. 19	Jan. 20	Jan. 22	Jan. 23
Copper, Electrolytic ¹	12.50	12.25	12.25	12.25	12.00	12.00
Copper, Lake	12.50	12.50	12.50	12.50	12.00	12.00
Tin, Straits, New York	47.00	46.50	46.25	....	45.25	45.00
Zinc, East St. Louis ²	5.75	5.75	5.75	5.75	5.50	5.50
Lead, St. Louis ³	5.35	5.35	5.35	5.35	5.35	5.35

¹ Delivered Conn. Valley. Deduct ¼c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	46.75c.	48.00c.
Copper, Lake	13.25c.	13.125c.
Copper, electro.	13.50c.	13.125c.
Copper, castings	13.125c.	12.875c.
*Copper sheets, hot-rolled	20.62c.	20.62c.
*Yellow brass sheets ...	18.65c.	18.65c.
*Seamless brass tubes...	21.40c.	21.40c.
*Seamless copper tubes...	21.12c.	21.12c.
*Yellow brass rods	14.57c.	14.57c.
Zinc slabs	6.85c.	7.50c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig ...	6.50c.	6.00c.
Lead, bar	8.95c.	8.75c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.00c.	19.50c.
Solder, ½ and ½	29.12c.	28.25c.
Babbitt metal, anti-friction grade	27.50c.	20.00c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33½; on brass sheets and rods, 40; on brass tubes, 33½, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hv., crucible...	10.125c.	10.75c.
Copper, hv. and wire...	9.125c.	9.50c.
Copper, light and bottoms	8.125c.	8.625c.
Brass, heavy	5.50c.	6.00c.
Brass, light	4.625c.	5.375c.
Hvy. machine composition	8.375c.	9.00c.
No. 1 yel. brass turnings	5.125c.	5.625c.
No. 1 red brass or composition turnings	8.00c.	8.50c.
Lead, heavy	4.50c.	4.875c.
Cast aluminum	9.00c.	10.00c.
Sheet aluminum	14.25c.	15.25c.
Zinc	3.125c.	4.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, \$157 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12.50c. a lb.

IRON AND STEEL SCRAP

... Most markets quiet and on the soft side ... Composite price down 13c. to \$17.54.

JAN. 23—Except at St. Louis, mill transactions continue at a minimum, and the market is bearish and on the soft side, as reflected by a drop of 13c. in the composite price for No. 1 steel, the first change since Dec. 26. The average price of No. 1 at Pittsburgh is unchanged, but the \$1 range last week has been eliminated by quoting a flat \$18.50. The Chicago average is down 12½c., based on broker transactions, since no mill sales are reported. Small lots of Nos. 1 and 2 steel sold into consumption in eastern Pennsylvania have pulled quoted prices down 25c. on the average. Cleveland and Youngstown prices are off 50c. on practically every item listed. Detroit brokers are bearish and buying prices there are due for a fall before the end of the week. Sale of 12,000 tons of No. 2 steel to a St. Louis mill has depressed dealer buying prices 50c. on that grade, but a smaller sale of No. 1 has strengthened the latter a like amount. At Buffalo, some strength is seen in the raising of a mill's offering price, though no material was purchased. The market at Birmingham is definitely softer.

Pittsburgh

The activity surrounding sales into consumption of No. 1 heavy melting steel at \$19 a ton or better which existed in the early part of last week has subsided considerably but there appears to be some occasional and isolated undercover buying close to that figure for prompt shipment. On the other hand, however, brokers in the immediate Pittsburgh district refuse to pay over \$18.25 in covering No. 1 steel orders. They are, however, obtaining little or no material at that price. Dealers have offered brokers No. 1 steel at \$18.50. The scrap situation in the Pittsburgh area has received its strength entirely as a result of weather and river conditions. All factors in the present market being appraised, No. 1 heavy melting steel this week is quoted at a flat \$18.50, unchanged from last week's average, but reflecting the elimination of the top and bottom range in last week's quotation.

Chicago

This market is still very quiet. No mill sales have been reported in the past week and the slight strength evident a week ago is gradually disappearing. Brokers can now buy heavy melting freely at \$16.50, and an occasional car at 25c. less. No. 1 steel, which last week was quoted a flat

\$16.50, ranges from \$16.25 to \$16.50 today. The disappearance of snow and milder weather probably will cause more scrap to flow in from the country shortly.

Philadelphia

With finished steel backlogs continuing to decline rapidly, new scrap commitments in this district are being kept at a minimum. Small lots of No. 1 and No. 2 were purchased in the past week at \$17.50 and \$16.50 respectively. Both these prices represent declines of 50c. from preceding sales. While brokers are paying \$18 covering on heavy breakable cast, it is understood that one mill has purchased a small lot of loosely graded material slightly below this level. Outside of the cold weather which has restricted the operations of the small collectors and yard processing, the market still lacks strengthening factors. To obtain uniformity with other district markets, the classification "No. 1 machinery cast" has been changed to "No. 1 cupola cast." The material covered by both classifications is identical. The grade "mixed yard cast," which today accounts for a large portion of scrap sold to foundries, has been added to the list.

Youngstown

No. 1 heavy melting steel is quoted down 50c. per ton this week to a range of \$17.50 to \$18. The top figure represents an actual transaction with a mill at a nearby point. Other mills are running on old orders and may be in the market in early February if open-hearth activity maintains its present good pace.

Cleveland

The price trend is lower here, the result of prolonged absence from the market by mills. Dealer buying prices have weakened slightly. Although the cold weather has delayed deliveries and hampered collections, scrap from manufacturing plants is unaffected. No. 1 heavy melting at the start of this week was being quoted \$17 to \$17.50 per ton, down 50c.

Buffalo

Strengthening tendencies are seen in the market this week in spite of a lack of sales. One mill here has made an upward revision in its offering price, no materials having moved at previous figures. Stockpiles are of reasonable size and at present rates of plant operation are being steadily consumed.

St. Louis

Dealers report the sale of 12,000 tons of No. 2 heavy melting steel to two East Side steel mills at \$15 a ton and

a round tonnage of No. 1 heavy melting to another East Side mill at \$16, all for delivery within the next 60 days. The result was an advance of 50c. a ton in No. 1 and a decline of 50c. a ton in No. 2 in dealers' prices. Rails for rolling are 25c. a ton less. Cold weather continues to hamper scrap operations. Railroad lists: Chicago, Burlington & Quincy, 2700 tons; Chicago, Rock Island & Pacific, 1700 tons, and Alton, 1700 tons.

Cincinnati

Price increases in other areas gave an intangible strength to the district scrap market, holding current quotations at the same level as last week.

Birmingham

Birmingham scrap is off \$1 per ton. Larger brokers made offers at this figure without any takers. An analysis of the drop rests on three factors, one being lack of bottoms for export business, plants operating on backlogs to the extent of 50 per cent with new business not expected until Feb. 1 and the difficulty of scrap collections due to bad weather. Plants have sufficient scrap on hand to take care of requirements for some weeks.

Detroit

A definite softness was quite apparent in the Detroit scrap market early in the week. Dealers have been unloading scrap rapidly, further adding to the softness. The indicated trend is sharply downward because of pessimism, but prices probably will not go off more than 25c. to 50c. per ton during this week, it is predicted.

New York

Dealers' buying prices for Nos. 1 and 2 steel, heavy breakable cast and steel turnings are 50c. lower on cars, in conformance with the softness in the Philadelphia market. The price of No. 2 steel delivered to barges for export is also softer, but No. 1 steel is firm because of the relatively smaller amount of supply. Recent Japanese purchases have been confined to the West Coast.

Boston

With steel mill operations shrinking, and England still remiss on furnishing exporters with boats, business has come almost to a standstill. Even New England foundries, usually steady although not heavy buyers of machinery and textile cast, were not a market factor the past week. Following the covering of urgent skeleton needs by a Pennsylvania mill, brokers have dropped their prices 35c. to 75c. a ton, and the market for mixed borings and turnings is down 25c. to 50c. In contrast, the market for turnings is a shade firmer on limited transactions.

Toronto

Canadian iron and steel scrap markets were dull and featureless during the past week, with prices steady and unchanged. Deliveries to dealers' yards dropped to the lowest level in months.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$18.50
Railroad heavy melting	\$19.00 to 19.50
No. 2 heavy melting	16.50 to 17.00
Railroad scrap rails	19.00 to 19.50
Rails 3 ft. and under	22.00 to 22.50
Comp. sheet steel	18.50
Hand bundled sheets	17.00 to 17.50
Heavy steel axle turn.	16.50 to 17.00
Machine shop turnings	12.50 to 13.00
Short shov. turnings	14.00 to 14.50
Mixed bor. & turn.	12.00 to 12.50
Cast iron borings	12.00 to 12.50
Cast iron carwheels	19.00 to 19.50
Heavy breakable cast.	15.50 to 16.00
No. 1 cupola cast	18.50 to 19.00
RR. knuckles & coup.	22.00 to 22.50
Rail coil springs	22.50 to 23.00
Rail leaf springs	22.50 to 23.00
Rolled steel wheels	22.50 to 23.00
Low phos. billet crops	23.50 to 24.00
Low phos. punchings	21.50 to 22.00
Low phos. heavy plate	21.00 to 21.50
Railroad malleable	21.50 to 22.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.50 to \$18.00
No. 2 hvy. mltng. steel.	16.50 to 17.00
Hydraulic bund., new.	17.50 to 18.00
Hydraulic bund., old.	14.00 to 14.50
Steel rails for rolling	21.50 to 22.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast.	18.00
No. 1 cupola cast	20.00 to 20.50
Stove plate (steel wks.)	15.00
Railroad malleable	22.00
Machine shop turn.	12.00
No. 1 blast furnace	11.00
Cast borings	11.50 to 12.00
Heavy axle turnings	15.00 to 15.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.50 to 22.00
Steel axles	22.50
Shafting	23.00 to 23.50
Spec. iron & steel pipe	17.50
No. 1 forge fire	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50
Mixed yard scrap	17.00 to 17.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton

Hvy. mltng. steel	\$16.25 to \$16.50
Auto. hvy. mltng. steel alloy free	15.00 to 15.50
No. 2 auto steel	12.00 to 12.50
Shoveling steel	16.25 to 16.50
Factory bundles	15.25 to 15.75
Dealers' bundles	13.75 to 14.25
No. 1 busheling	14.75 to 15.25
No. 2 busheling, old.	6.00 to 6.50
Rolled carwheels	18.50 to 19.00
Railroad tires, cut	19.00 to 19.50
Railroad leaf springs	18.50 to 19.00
Steel coup. & knuckles	18.50 to 19.00
Axle turnings	15.00 to 15.50
Coil springs	19.50 to 20.00
Axle turn. (elec.)	17.00 to 17.50
Low phos. punchings	19.50 to 20.00
Low phos. plates 12 in. and under	19.00 to 19.50
Cast iron borings	8.50 to 9.00
Short shov. turn.	10.00 to 10.50
Machine shop turn.	8.50 to 9.00
Rerolling rails	19.00 to 19.50
Steel rails under 3 ft.	19.00 to 19.50
Steel rails under 2 ft.	19.50 to 20.00
Angle bars, steel	18.00 to 18.50
Cast iron carwheels	16.50 to 17.00
Railroad malleable	18.50 to 19.00
Agric. malleable	14.50 to 15.00

Per Net Ton

Iron car axles	21.75 to 22.25
Steel car axles	20.50 to 21.00
Locomotive tires	14.50 to 15.00
Pipes and flues	11.00 to 11.50
No. 1 machinery cast.	13.75 to 14.25
Clean auto. cast	14.00 to 14.50
No. 1 railroad cast.	13.25 to 13.75
No. 1 agric. cast	11.50 to 12.00
Stove plate	9.00 to 9.50
Grate bars	9.50 to 10.00
Brake shoes	11.00 to 11.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.50 to \$18.00
No. 2 hvy. mltng. steel.	16.50 to 17.00
Low phos. plate	20.50 to 21.00
No. 1 busheling	16.75 to 17.25
Hydraulic bundles	17.00 to 17.50
Machine shop turn.	11.00 to 11.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.00 to \$17.50
No. 2 hvy. mltng. steel.	16.00 to 16.50
Comp. sheet steel	16.50 to 17.00
Light bund. stampings	13.50 to 14.00
Drop forge flashings	15.00 to 15.50
Machine shop turn.	10.00 to 10.50
Short shov. turn.	11.00 to 11.50
No. 1 busheling	15.75 to 16.25
Steel axle turnings	15.00 to 15.50
Low phos. billet and bloom crops	22.50 to 23.00
Cast iron borings	11.00 to 11.50
Mixed bor. & turn.	11.00 to 11.50
No. 2 busheling	11.00 to 11.50
No. 1 cupola cast	18.50 to 19.00
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50
Rails under 3 ft.	22.00 to 22.50
Rails for rolling	21.00 to 21.50
Railroad malleable	21.00 to 21.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$17.00 to \$17.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Scrap rails	17.50 to 18.00
New hvy. b'ndled sheets	15.50 to 16.00
Old hydraul. bundles	14.50 to 15.00
Drop forge flashings	15.00 to 15.50
No. 1 busheling	15.00 to 15.50
Machine shop turn.	10.50 to 11.00
Shov. turnings	13.50 to 14.00
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Knuckles & couplers	21.00 to 22.00
Coil & leaf springs	21.00 to 22.00
Rolled steel wheels	21.00 to 22.00
No. 1 machinery cast.	18.00 to 18.50
No. 1 cupola cast.	17.00 to 17.50
Stove plate	15.00 to 15.50
Steel rails under 3 ft.	22.50 to 23.00
Cast iron carwheels	18.00 to 18.50
Railroad malleable	19.50 to 20.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$16.00 to \$16.50
No. 1 hvy. melting	15.00 to 15.50
No. 2 hvy. melting	14.00 to 14.50
No. 1 locomotive tires	16.50 to 17.00
Misc. stand sec. rails	16.00 to 16.50
Railroad springs	17.00 to 17.50
Bundled sheets	10.00 to 10.50
No. 1 busheling	13.75 to 14.25
Cast bor. & turn.	5.50 to 6.00
Machine shop turn.	7.00 to 7.50
Heavy turnings	10.50 to 11.00
Rails for rolling	17.75 to 18.25
Steel car axles	19.50 to 20.00
No. 1 RR. wrought	11.00 to 11.50
No. 2 RR. wrought	14.50 to 15.00
Steel rails under 3 ft.	19.00 to 19.50
Steel angle bars	16.00 to 16.50
Cast iron carwheels	18.00 to 18.50
No. 1 machinery cast.	17.00 to 17.50
Railroad malleable	16.00 to 16.50
No. 1 railroad cast.	16.00 to 16.50
Stove plate	11.00 to 11.50
Grate bars	10.50 to 11.00
Brake shoes	11.00 to 11.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	12.00 to 12.50
Scrap rails for mltng.	18.00 to 18.50
Loose sheet clippings	9.50 to 10.00
Hydrau. b'ndled sheets	13.50 to 14.00
Cast iron borings	5.00 to 5.50
Machine shop turn.	6.00 to 6.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	4.00 to 4.50
Rails for rolling	19.50 to 20.00
No. 1 locomotive tires	15.50 to 16.00
Short rails	21.00 to 21.50
Cast iron carwheels	16.00 to 16.50
No. 1 machinery cast.	17.50 to 18.00
No. 1 railroad cast.	15.50 to 16.00
Burnt cast	9.00 to 9.50
Stove plate	9.00 to 9.50
Agricul. malleable	14.00 to 14.50
Railroad malleable	17.00 to 17.50
Mixed hvy. cast.	15.00 to 15.50

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$16.00
No. 2 hvy. melting steel	15.00
No. 1 busheling	13.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00

Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	20.00
No. 1 RR wrought	14.00
No. 1 cast	15.00
No. 2 cast	11.00
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	\$13.00 to \$13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
Borings and turnings	7.00 to 7.50
Long turnings	6.50 to 7.00
Short shov. turnings	8.50 to 9.00
No. 1 machinery cast.	13.50 to 14.00
Automotive cast	15.00 to 15.50
Hvy. breakable cast.	10.50 to 11.00
Stove plate	9.00 to 9.50
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel.	12.50 to 13.00
Sheet clippings	8.75 to 9.75
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.26

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$13.50 to \$14.00
No. 2 hvy. mltng. steel.	12.00 to 12.50
Hvy. breakable cast.	14.00
No. 1 machinery cast.	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	19.00 to 20.00
Clean steel turnings*	7.50 to 8.00
Cast borings*	8.00 to 9.00
No. 1 blast furnace	8.00 to 9.00
Cast borings (chem.)	Nominal
Unprepared yard scrap	7.50 to 8.00
Light iron	5.00 to 5.50
Per gross ton delivered local foundries:	
No. 1 machin. cast.	\$17.50 to \$19.25
No. 2 cast	16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton on cars:

Breakable cast	\$13.00 to \$13.15
Machine shop turn.	7.15 to 7.55
Mixed bor. & turn.	5.50 to 5.75
Bun. skeleton long	9.75 to 10.25
Shafting	18.25 to 18.50
Stove plate	9.65 to 9.75
Cast bor. chemical	9.00 to 9.50
Per gross ton delivered consumers' yards:	
Textile cast	\$17.00 to \$19.00
No. 1 machine cast.	17.00 to 19.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$13.00 to \$13.50
No. 2 steel	12.00 to 12.50

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$16.00 to \$17.50
No. 2 hvy. mltng. steel.	15.00 to 16.50

CANADA

Dealers' buying prices at these yards, per gross ton:

Toronto Montreal	
Low phos. steel	\$11.50 \$11.00
No. 1 hvy. mltng. steel.	11.00 10.50
No. 2 hvy. mltng. steel.	9.75 9.25
Mixed dealers steel	8.75 8.25
Drop forge flashings	9.75 9.25
New loose clippings	8.75 8.25
Busheling	5.50 5.00
Scrap pipe	7.75 7.25
Steel turnings	6.50 6.00
Cast borings	6.00 5.50
Machinery cast	17.00 to 16.50
Dealers' cast	16.00 to 15.50
Stove plate	12.00 to 11.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	12.00 to 12.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	\$15.00 to \$15.50
No. 2 hvy. mltng. steel.	14.00 to 14.50
Rails (scrap)	15.50
Stove plate	8.65 to 8.75

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel.	Nominal
No. 2 hvy. mltng. steel.	Nominal

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling\$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open h-arth or bessemer\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.
Pittsburgh, Chicago or Cleveland 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.45c.
Galveston 2.25c.
9/32 in. to 47/64 in. \$3 a net ton higher.
Quantity extras apply.

SOFT STEEL BARS

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.15c.
On cars dock Tex. Gulf ports.. 2.50c.
On cars dock Pacific ports.... 2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports.. 2.50c.
On cars dock Pacific ports.... 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 2.15c.
Detroit, delivered 2.25c.
On cars dock Tex. Gulf ports.. 2.50c.
On cars dock Pacific ports.... 2.50c.

IRON BARS

Chicago and Terre Haute..... 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c.

Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg.... 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports.... 3.95c.

STRUCTURAL SHAPES

Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports.... 2.70c.

STEEL SHEET PILING

Base per Lb.
Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports.... 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill
Standard rails, heavier than 60 lb., per gross ton.....\$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points
Light rails (from billets) per gross ton\$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.
Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports. 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.10c.
Detroit, delivered 2.20c.
Philadelphia, delivered 2.27c.
Granite City 2.20c.
On cars dock Pacific ports.... 2.60c.
Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.05c.
Detroit, delivered 3.15c.
Granite City 3.15c.
Philadelphia, delivered 3.37c.
On cars dock Pacific ports.... 3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports.... 4.00c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.

Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Terns

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary.... 3.80c.
F.o.b. cars dock Pacific ports. 4.50c.
Vitreous Enameling Stock, 20 Gage*
Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports.... 3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary\$5.00
Standard cokes, Granite City.. 5.10
Special Coated Manufacturing Terns
Per Base Box
Granite City\$4.40
Pittsburgh or Gary 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh per Package, 112 sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.60

Black Plate, 29 gage and lighter
Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.10c.
Detroit, delivered 2.20c.
On cars dock Pacific ports.... 2.70c.
Cooperage Stock
Pittsburgh & Chicago 2.20c.

COLD ROLLED STRIP*

Base per Lb
Pittsburgh, Youngstown or Cleveland 2.80c.
Chicago 2.90c.
Detroit, delivered 2.90c.
Worcester 3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip
Pittsburgh, Youngstown, or Cleveland 2.95c.
Detroit, delivered 3.05c.
Worcester 3.35c.

COLD ROLLED SPRING STEEL

Pittsburgh and Cleveland Worcester

Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cut nails, carloads	3.85

Base per 100 Lb.

Annealed fence wire	\$3.05
Galvanized fence wire	3.30
Twisted barless wire	3.40
Woven wire fence, 12½ gage and lighter, base col.	67
Woven wire fence, 9 and 11 gage, base col.	70
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool.	\$2.70
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool.	\$2.88

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel	Black Galv.	In.	Black Galv.	In.
1/8	56	36	1/8 & 3/8	49 + 30
1/4 to 3/8	59	43 1/2	1/2 to 3 1/2	24 6 1/2
1/2	63 1/2	54	3 3/4	30 13
3/4	66 1/2	58 1/2	1 & 1 1/4	34 19
1 to 3	68 1/2	60 1/2	1 1/2	38 21 1/2
			2	37 1/2 21

Lap Weld

2	81	52 1/2	2	30 1/2 15
2 1/2 & 3	64	55 1/2	2 1/2 to 3 1/2	31 1/2 17 1/2
3 1/2 to 6	66	57 1/2	4	33 1/2 21
7 & 8	65	55 1/2	4 1/2 to 8	32 1/2 20
9 & 10	64 1/2	55	9 to 12	28 1/2 15
11 & 12	63 1/2	54		

Butt weld, extra strong, plain ends	1/8	1/4	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2
1/8	54 1/2	41 1/2	1/2 to 3/8	45 1/2	53 1/2	65 1/2	57 1/2	67	60

Lap weld, extra strong, plain ends	2	2 1/2 & 3	3 1/2 to 6	7 & 8	9 & 10	11 & 12
2	59	51 1/2	55 1/2	59	56	55
2 1/2 & 3	63	55 1/2	59	56	55	54
3 1/2 to 6	66	59	56	55	54	
7 & 8	65 1/2	56	55	54		
9 & 10	64 1/2	55	54			
11 & 12	63 1/2	54				

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless	Hot Rolled	Lap Weld
	Drawn	Hot	Hot
1 in. o.d.	12 B.W.G.	\$ 9.01	\$ 7.82
1 1/4 in. o.d.	13 B.W.G.	10.67	9.26
1 1/2 in. o.d.	13 B.W.G.	11.70	10.23
1 3/4 in. o.d.	13 B.W.G.	13.42	11.64
2 in. o.d.	13 B.W.G.	15.03	13.04
2 1/4 in. o.d.	13 B.W.G.	16.76	14.54
2 1/2 in. o.d.	12 B.W.G.	18.45	16.01
2 3/4 in. o.d.	12 B.W.G.	20.21	17.54
3 in. o.d.	12 B.W.G.	21.42	18.59
3 1/4 in. o.d.	12 B.W.G.	22.48	19.50
3 1/2 in. o.d.	11 B.W.G.	28.37	24.62
4 in. o.d.	10 B.W.G.	35.20	30.54
4 1/2 in. o.d.	10 B.W.G.	43.04	37.35
5 in. o.d.	9 B.W.G.	54.01	46.87
6 in. o.d.	7 B.W.G.	82.93	71.96

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 19,999 lb. or ft.	10%
10,000 lb. or ft. to 9,999 lb. or ft.	30%
5,000 lb. or ft. to 4,999 lb. or ft.	30%
2,000 lb. or ft. to 1,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	\$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham.	46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles.	52.00
F.o.b. dock, Seattle.	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles.	55.00
F.o.b. dock, Seattle.	52.00

Class "A" and gas pipe, \$3 extra 4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45, Birmingham, and \$53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
1/2 in. and 6 in. and smaller.	68 1/2
Larger and longer up to 1 in.	66
1 1/2 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
3/16 in. to 1 in. inclusive	64
1 1/2 in. to 1 1/2 in. incl.	62
1 1/2 in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.	
1/2 in. and smaller	67 70
3/16 to 1 in.	64 65
1 1/2 in. and larger.	62 62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72 1/2
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83 1/2

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

(1/2 in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham\$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ...65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller.	50 and 10
Milled headless set screws, cut thread 1/4 in. and larger.	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton. Open-hearth grade, base.\$2.70c. Delivered, Detroit

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati.	23.06
Northern, delivered, Cincinnati.	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 60c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown..	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	\$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown ..	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo....\$28.50

Gray Forge

Valley or Pittsburgh furnace..\$22.50

Charcoal

Lake Superior furnace	\$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Foundry iron	\$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto

Foundry iron	\$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	
Per Gross Ton	
Domestic, 80% (carload)	\$100.00

Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size	
50% (carload lots, bulk)	\$69.50*
50% (ton lots, packed)	82.00*
75% (carload lots, bulk)	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio	
Per Gross Ton	
10.00 to 10.50%	\$32.50
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.	
For each unit of manganese over 2%, \$1 per ton additional.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	

Silvery Iron

Per Gross Ton	
F.o.b. Jackson, Ohio, 5.00 to 5.50%	\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.	
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.	

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract	
4 to 6% carbon	11.00c.*
2% carbon	17.50c.*
1% carbon	18.50c.*
0.10% carbon	20.50c.*
0.06% carbon	21.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract	
3% carbon	\$98.00
2.50% carbon	103.00
2% carbon	108.00
1% carbon	118.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads....	\$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	\$2.70 to \$2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	\$2.25†
Ferrocobalttitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	\$142.50
Ferrocobalttitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	\$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville	\$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo. f.o.b. Langeloth, Pa.	80c.

* Spot prices are \$5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.50%	\$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty	
Per Unit	
Algerian, low P, Cu free, dry, 55 to 58% Fe.	12c.
Swedish, low P, 68% Fe.	12c.
Swedish, basic or foundry, 65% Fe	11c.
Caucasian, washed, 52% Mn.	53c.
African, Indian, 44 to 48% Mn.	48c.
African, Indian, 49 to 51% Mn.	48c.
Brazilian, 46 to 48% Mn.	44c.
Cuban, del'd, duty free, 51% Mn 60c.	

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered. \$23.00 to \$24.00	
Tungsten, domestic, scheelite delivered	23.00 to 25.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	\$19.00
Rhodesian, 45%	22.00
Rhodesian, 48%	26.00 to \$27.00
Turkish, 48-49%	27.00 to 28.00
Turkish, 45-46%	25.00 to 26.50
Turkish, 40-41%	22.00
Chrome concentrates c.i.f. Atlantic Seaboard, per gross ton: Turkish, 48-49%	\$27.00 to \$28.00

* All foreign ore prices are nominal

FLUORSPAR

Per Net Ton	
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$21.00
Domestic, f.o.b. Ohio River landing barges	21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines. \$20.00 to 22.00	
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	\$25.00 to \$25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	\$31.00
ditto, in bags, f.o.b., same mines	\$32.60

FUEL OIL

Per Gal	
No. 2, f.o.b. Bayonne, N. J.	5.10c.
No. 6, f.o.b. Bayonne, N. J.	3.57c.
No. 5 Bur. Stds., del'd Chicago 3.25c.	
No. 6 Bur. Stds., del'd Chicago 2.75c.	
No. 3 distillate, del'd Cleve'd. 5.25c.	
No. 4 industrial, del'd Cleve'd. 5.00c.	
No. 5 industrial, del'd Cleve'd. 4.25c.	
No. 6 industrial, del'd Cleve'd. 3.875c.	

COKE

Per Net Ton	
Furnace, f.o.b. Connells-ville, Prompt	\$4.00 to \$4.25
Foundry, f.o.b. Connells-ville, Prompt	5.50 to 5.75
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England....	12.50
Foundry, by - product del'd Newark or Jersey City	11.38 to 11.90
Foundry, by - product Philadelphia	11.13
Foundry, by - product delivered Cleveland ..	11.05
Foundry, by - product delivered Cincinnati ..	10.50
Foundry, Birmingham..	7.50
Foundry, by - product del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.75c.
Wire, black, soft annealed	3.30c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.80c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and starting charge. All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
*Plates, 1/4 in. and heavier	3.76c.
*Structural shapes	3.75c.
*Soft steel bars, round	3.84c.
Iron bars, Swed. charcoal	9.50c.
**Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
*Hot-rolled strip, soft O.H.	3.96c.
*Hot-rolled sheets (8-30 ga.)	3.58c.
*Galv. sheets (24 ga.)	5.23c.
Long ternes (24 ga.)	5.90c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c.
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
*Floor plate, 1/8 in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed	4.85c.
Wire, galv. (No. 9)	4.70c.
O. H. spring steel, flats	4.70c.
Common wire nails, per keg	3.50c.

* For lots 400 to 1999 lb.
** For lots less than 1500 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.85c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Cold-fin. bars (1500 lb. over)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.05c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.72c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
Black ann'd wire, per 100 lb.	\$3.10
No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per keg	2.75
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lbs. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.52c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier*	4.57c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	3.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.
The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb., plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.	

BUFFALO

	Base per Lb.
Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.15c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.70c.
Bands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick	
	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	\$60.30
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10
Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55
Chrome Brick	
	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00
Magnesite Brick	
	Net per Ton
Standard f.o.b. Baltimore and Chester	\$72.00
Chemically bonded, f.o.b. Baltimore	61.00
Grain Magnesite	
	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

* None available.

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	3.55c.
*Structural shapes	3.55c.
*Soft steel bars small shapes, iron bars (except bands)	3.35c.
†Reinforc. steel bars, square and deformed	2.76c.
Cold-finished steel bars	4.16c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	3.85c.
*Spring steel	5.00c.
*Hot-rolled anneal. sheets	3.55c.
†Galvanized sheets (No. 24)	4.75c.
*Diam. pat. floor plates, 1/4 in.	5.25c.

*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga.	4.75c.
Strip	3.60c.
Reinforcing bars	3.50c.
Floor plates	5.88
Cold finished bars	4.43
Machine and carriage bolts	.50 & 10 off list
Rivets (structural)	\$4.60 base
On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.	

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	4.00c.	3.80c.	3.40c.
Shapes, standard	4.00c.	3.80c.	3.50c.
Soft steel bars	4.00c.	3.95c.	4.00c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.525c. open.	2.975c.	
Hot-rolled sheets (No. 10)	3.85c.	4.10c.	3.70c.
Galv. sheets (No. 24 and lighter)	5.15c.	5.00c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.00c.	4.75c.
Cold-finished steel			
Rounds	6.80c.	6.60c.	7.00c.
Squares and hexagons	8.05c.	7.85c.	8.25c.
Flats	8.55c.	8.35c.	8.25c.
Common wire nails—base per kegless carload	3.25c.	3.25c.	3.15c.

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	3.43c.
Structural shapes	3.65c.
Plates	3.60c.
Floor plates	5.27c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.43c.
Cold-rolled sheets	4.50c.
*Galvanized sheets	4.84c.
Hot rolled strip, under 12 gage	3.68c.
Hot rolled strip, above 12 gage	3.43c.
Cold-finished bars	3.80c.
Cold-rolled strip	3.40c.
Hot-rolled alloy steel (SAE 3100 Series)	5.97c.
Cold-rolled alloy (SAE 2300)	8.45c.

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

National Distillers Products Corp., 120 Broadway, New York, has let general contract to Frank Messer & Sons, Inc., 2525 Burnet Avenue, Cincinnati, for seven-story and basement addition to branch plant at 7818 Anthony Wayne Avenue, Cincinnati, for stock house, storage and distribution. Cost about \$250,000 with equipment. Sanderson & Porter, 52 William Street, New York, is engineer.

General Electric Co., Schenectady, N. Y., plans extensions and improvements in section of local plant, and will carry out work with company forces. Cost reported close to \$50,000 with equipment.

Public Works Officer, Building 3, Navy Yard, Brooklyn, asks bids (no closing date stated) for control, air, oxygen, acetylene and carbon dioxide fire protection systems, and heating and ventilating systems in building at local yard, about 30 x 803 ft. (Specifications 9473).

Apex Die Tool Corp., 524 West Broadway, New York, dies and tools, has leased space in building at 147 West Twenty-second Street, and will occupy for plant, expanding present facilities.

Long Is'and Lighting Co., 250 Old Country Road, Mineola, L. I., is arranging fund of about \$3,000,000 for expansion and improvements in power plants and system in 1940, including station equipment, transmission and distributing lines, power substations and other properties.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Jan. 30 for one hydraulic pressure pump (Circular 393), quantity of gages (Circular 392), one to 16 circulating air fans (Circular 391); until Jan. 31 for quantity of gages (Circular 397), quantity of malleable iron castings (Circular 396); until Feb. 2 for quantity of steel castings (Circular 395).

Heyden Chemical Corp., 50 Union Square, New York, has let general contract to Austin Co., 16112 Euclid Avenue, Cleveland, for three-story and basement addition, 40 x 100 ft., to branch plant on River Drive, Garfield, N. J. Cost over \$60,000 with equipment.

Chief of Engineers, Contracting Officer, Munitions Building, Washington, asks bids until Feb. 1 for four heating kettles for bituminous material, 150-gal. capacity, mounted on two-wheel pneumatic-tired tractor with barrel hoist for Brooklyn yard (Circular 80).

Signal Corps Procurement District, Army Base, 58th Street and First Avenue, Brooklyn, asks bids until Jan. 29 for quantity of gear assemblies (Circular 258), 600 permanent magnets (Circular 257).

Calvert Distillers Corp., 405 Lexington Avenue, New York, has asked bids on general contract for one-story addition to plant at Relay, Md. Cost over \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 30 for dust-collecting equipment for sand blast room and for foundry cleaning machine (Schedule 474) for Brooklyn Navy Yard; 12 portable, air-turbine-driven, gas-exhausting blowers (Schedule 499), quantity of cocks and plugs (Schedule 497) for Brooklyn and Philadelphia yards; until Feb. 2 for 500 aircraft fuel quantity gages (Schedule 494) for Philadelphia Navy Yard; until Feb. 6 for 410 storage batteries (Schedule 479) for Philadelphia and Mare Island yards.

Wright Aeronautical Corp., 132 Beckwith Avenue, Paterson, N. J., airplane engines and parts, has let general contract to Mahony-Troast Construction Co., 657 Main Avenue, Passaic, N. J., for new one-story foundry, 122 x 165 ft., at works on East 19th Street. Cost over \$100,000 with equipment.

Peter J. Schweitzer, Inc., 994 Newark Avenue, Elizabeth, N. J., manufacturer of mani-

fold, carbon and other special paper stocks, plans one-story and basement addition, 90 x 150 ft. Cost over \$85,000 with equipment. William E. Lehman, 972 Broad Street, Newark, N. J., is architect.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Feb. 2 for 123,500 packing stops (brass forgings) (Circular 989), 26,200 packing stops (small steel fabrication) (Circular 1017); until Feb. 7 for 200 acetylene tanks, each with capacity of 275 cu. ft., and 500 oxygen tanks, each with capacity of 200 cu. ft. (Circular 1009).

◀ BUFFALO DISTRICT ▶

Standard Brewing Co., 440 Lake Avenue, Rochester, plans one-story addition for storage and distribution. Cost close to \$50,000 with equipment.

Great Lakes Carbon Corp., Pine Avenue and 57th Street, Niagara Falls, N. Y., plans one-story branch plant in Wilmington district, Los Angeles, where site has been acquired. Cost reported about \$60,000 with equipment. R. Mc. Beanfield, 1151 South Broadway, Los Angeles, is engineer. Executive offices of company are at 30 Rockefeller Plaza, New York.

◀ NEW ENGLAND ▶

Crompton & Knowles Loom Works, Inc., Grand Street, Worcester, has approved plans for one-story addition, about 15,000 sq. ft. of floor space, on Tainter Street, to be used for expansion in forge shop. Erection will be carried out by day labor. Cost close to \$45,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Jan. 30 for one dust-collecting unit (Circular 252).

Wiremold Co., Hartford, Conn., manufacturer of electric cable, conduits, fittings, etc., has let general contract to R. F. Jones Co., 15 Lewis Street, for one-story addition to plant at Elmwood, Conn. Cost over \$85,000 with equipment. J. Di Stasio & Co., 136 Liberty Street, New York, are engineers.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Banks, Mass., asks bids until Feb. 1 for one electric-operated pipe and bolt machine, one ball-bearing hand jointer and one scroll band saw (Circular 136-7).

United States Gypsum Co., 300 West Adams Street, Chicago, has asked bids on general contract for one-story addition to branch mill at Lisbon Falls, Me. Cost close to \$40,000 with equipment.

◀ OHIO AND INDIANA ▶

Cincinnati Milling Machine Co., Marburg Avenue and South Street, Cincinnati, milling machines and other tools and parts, will take bids soon on general contract for one-story addition, 400 x 500 ft., to be equipped primarily as a foundry. Cost over \$250,000 with equipment. Austin Co., 16112 Euclid Avenue, Cleveland, is engineer.

Hudepohl Brewing Co., 40 East McMicken Avenue, Cincinnati, has asked bids on general contract for two-story addition, 80 x 200 ft., to be equipped as a mechanical-bottling unit. Cost over \$100,000 with equipment. Felsberg & Gillespie, Ingalls Building, are architects.

Ohio Edison Co., Springfield, Ohio, is arranging fund of about \$6,500,000 for expansion and improvements in power plants and system during 1940, including addition to steam-electric generating plant at Toronto, Ont., with installation of new turbine-generator unit and accessories, high-pressure boilers

and auxiliary equipment. Cost about \$2,700,000 of gross sum noted. Extensions and improvements in transmission and distributing lines, power substations and other operating facilities will be made in Akron, Ohio, district, at cost of about \$2,000,000; at Youngstown and vicinity, to cost \$1,400,000; and in Springfield area, to cost about \$450,000.

Lamneck Products, Inc., 416 Dublin Avenue, Columbus, Ohio, sheet metal products, has let general contract to Martin L. Bauer Construction Co., Middletown, Ohio, for extensions and improvements in property on Cremo Avenue, Middletown, including modernization of present structures and several one-story extensions. Company will remove present plant to new location.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Jan. 29 for 27,500 lin. ft. of steel cable (Circular 945), exhaust manifold cylinder section assemblies, exhaust manifold sleeve assemblies (Circular 929); until Jan. 31 for 20 turret punches (Circular 951), quantity of condulets and conduit covers (Circular 932); until Feb. 1 for quantity of hand gear box control universal joints (Circular 956), quantity of aluminum alloy tubing (Circular 952), 11 blacksmith's forges, 38 x 42 in., with coal box, water tank and motor-driven blower (Circular 955).

P. R. Mallory Co., 3029 East Washington Street, Indianapolis, electrical equipment, welding apparatus, special alloys, etc., has let general contract to Orville Wise, 2537 Burton Street, for one-story addition. Cost about \$40,000 with equipment. D. A. Bohlen & Son, Majestic Building, are architects.

◀ MICHIGAN DISTRICT ▶

Sheet Aluminum Corp., Jackson, Mich., has approved plans for one-story addition, to be equipped as a strip mill. Cost over \$60,000 with equipment.

W. O. Barnes Co., Inc., 1297 Terminal Avenue, Detroit, plans one-story addition. Cost about \$40,000 with equipment. Giffels & Vallet, Inc., and L. Rossetti, Marquette Building, are architects and engineers.

Micromatic Hone Corp., 7401 Dubois Avenue, Detroit, has leased additional space in vicinity of present plant, and will equip for large increase in capacity.

Bundy Tubing Co., 10951 Hern Avenue, Detroit, plans new one-story plant on Hoover Road, Macomb County, vicinity of Detroit. Cost over \$50,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects and engineers.

◀ MIDDLE WEST ▶

Chicago Steel Service Co., 3912 South Ashland Avenue, Chicago, plans new two-story storage and distributing plant in vicinity of present warehouse. Cost over \$200,000 with mechanical handling and other equipment.

Perfex Corp., 415 West Oklahoma Avenue, Milwaukee, manufacturer of engine cooling radiators and parts, has asked bids on general contract for three-story addition, 40 x 100 ft. Cost over \$50,000 with equipment. Herbert W. Tullgren, 1234 North Prospect Avenue, is architect.

Milwaukee Electric Co., Milwaukee, is arranging fund of \$1,000,000 to be used during 1940 for expansion of steam-electric generating plant on Commerce Street, now under way. Work will include installation of turbine-generator units and accessories, high-pressure boilers and auxiliary equipment, with entire project to cost about \$4,100,000. During present year company also will expend close to \$1,500,000 for expansion and improvements in transmission and distributing lines, power substations and other operating structures.

United States Engineer Office, Canal Park, Duluth, Minn., asks bids until Feb. 6 for one portable electric arc welder, skid-mounted, 300-amp. capacity (Circular 23).

Metropolitan Utilities, Omaha, Neb., Walter Byrne, general manager, plans installation of new automatic mixing station to control blending ratio of natural gas and manufac-

tured gas at local gas control plant. Cost close to \$50,000 with equipment.

Purchasing and Contracting Officer, Office of District Quartermaster, CCC, Omaha, Neb., asks bids until Jan. 30 for quantity of vises, rivet sets, feeder gage set, pullers, pliers, soldering irons, screw drivers, grinder and other tools (Circular 5701-64).

City Council, Wray, Colo., plans extensions and improvements in municipal power plant, including installation of additional equipment. Bond issue of \$50,000 has been authorized.

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Jan. 30 for quantity of twist drills, files, hacksaw frames, chisels, draw gages, marking gages, nippers, oilers, pliers, scrapers, shears, bits, saw blades, thickness gages, hammers, soldering irons, awls, wrenches and other tools, totaling 168 items in all (Circular 398-108), quantity of electrical wire, cable and accessories, cutouts, switches, manhole frames and covers, potheads, etc. (Circular 6240-20); until Feb. 5 for lathes, jacks, hoist, steel safety cans, clamps, compressors, lathe dogs, drills, extractors, files, auto creepers, pliers, pullers, wrenches, vises, reamers, tool holders and other tools (Circular 398-110).

Locke Insulator Corp., Charles and Cromwell Streets, Baltimore, has asked bids on general contract for one-story addition at 2800 Light Street, to be used for expansion in pickling department. Cost over \$40,000 with equipment. W. S. Austin, Maryland Trust Building, is consulting engineer. Company is affiliated with General Electric Co., Schenectady.

General Purchasing Officer, Panama Canal, Washington, asks bids until Jan. 30 for quantity of cast iron water pipe fittings, valves, cylinder cocks, steam whistles, fire extinguishers and other equipment (Schedule 3859); until Feb. 1 for quantity of phosphor bronze wire, magnet wire, bare resistance wire, electric range wire, etc. (Schedule 3862); until Feb. 2 for 53,000 lin. ft. of flexible copper wire, 50,000 ft. of rubber-insulated copper wire, 10,000 ft. of stove copper wire, 7000 ft. of rigid steel conduit, conduit elbows, box connectors, pipe sleeving, vise stands and other equipment (Schedule 3861).

Parker Metal Decorating Co., Howard and Ostend Streets, Baltimore, metal products, has let general contract to Ratcliffe Construction Co., American Trust Building, for one-story addition. Cost about \$40,000 with equipment. Kubitz & Koenig, Emerson Tower Building, are consulting engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 30 for quantity of steel welding electrodes (Schedule 516), quantity of coil chain and weldless chain (Schedule 440), quantity of nails, spikes, brads, tacks, etc. (Schedule 448), quantity of copper rivet burrs, copper belt rivets, copper boat rivets, copper braziers rivets, and brass plate washers (Schedule 447), one motor-driven wood turning lathe and equipment (Schedule 462) for Eastern and Western navy yards; one 500-hp. locomotive and spare parts (Schedule 473) for Indian Head, Md.

◀ SOUTH ATLANTIC ▶

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 30 for one portable air compressor (Schedule 496), engine lathe (Schedule 492), floor-type drill (Schedule 505), tool and cutter grinder (Schedule 503), milling machine (Schedule 508) for Key West, Fla., naval station; one heavy-duty valve seat grinder (Schedule 510) for Pensacola, Fla., naval air station; all motor-driven.

◀ SOUTH CENTRAL ▶

Tennessee Valley Paper Mills, Inc., Huntingdon, Tenn., Gordon Browning, Huntingdon, president (former Governor of Tennessee), recently organized under Delaware laws, plans

new pulp and paper mill at Savannah, Tenn., consisting of several large one and multi-story units for production, with storage and distributing buildings, machine shop, pumping station and other mechanical departments. Initial mill will be given over to newsprint, using Southern slash pine as raw material, with later development to include other lines of paper manufacture. Contract is being made for TVA power, and transmission line will be extended to plant site, where large power substation will be built. Company has secured options on more than 100,000 acres of timberland properties in vicinity of Savannah, and will construct saw mills, with logging and other operating facilities for pulp wood production. Fund of \$6,000,000 is being arranged for entire project, of which approximately \$4,000,000 will be used for mill and machinery. Company will secure RFC loan in amount of about \$3,420,000, remainder of fund to be secured through sale of bonds and common stock, for which permission has been asked. S. W. Dugran, Knoxville, Tenn., is secretary and treasurer. Offices are being established at 720 Market Street, Knoxville.

Chattanooga Power Board, Chattanooga, Tenn., L. J. Wilhoit, chairman, has asked bids on general contract for one-story equipment storage and distributing building, with service and garage facilities for motor trucks and cars of department. Cost about \$225,000 with equipment. R. H. Hunt & Co., Chattanooga Bank Building, are architects.

◀ WESTERN PA. DIST. ▶

Gulf Refining Co., Gulf Building, Pittsburgh, plans new bulk gasoline terminal at Chattanooga, Tenn., comprising several one-story buildings, steel tank storage department, pumping station and other structures. Cost about \$250,000 with equipment. Application has been made for permission.

McCray & Esry, 607 West Second Street, Oil City, Pa., operating oil properties, plans new pressure station in oil field area, Petroleum Center, Venango County, to replace unit recently destroyed by fire. Installation will include two large compressors, motor-generator and auxiliary equipment. Cost over \$45,000.

◀ SOUTHWEST ▶

Sealright Co., Inc., Fairfax and Rickel Roads, Kansas City, Kan., manufacturer of bottle caps, seals, metal-capping equipment, etc., has asked bids on general contract for one-story addition, 80 x 155 ft. Cost over \$50,000 with equipment. Charles E. Keyser, 609 Minnesota Avenue, is architect. Main offices are at Fulton, N. Y.

Central Yards, Inc., 1200 Railway Exchange Building, St. Louis, F. E. Bates, engineer in charge, organized by several railroads, including Missouri-Pacific Railroad Co., Thirteenth and Olive Streets, St. Louis, plans new multi-story terminal for perishable food products on Missouri River, Kansas City, Mo., where site has been selected. It will comprise several units for dry and cold storage, with power station, shops and other auxiliary structures. Cost close to \$700,000 with equipment.

Burlington Railroad, 547 West Jackson Boulevard, Chicago, plans modernization and improvements in car yards and shops at Carr and Second Streets, St. Louis. Cost about \$75,000 with equipment. Company engineer, Lines East of Missouri River, first noted address, in charge.

City Council, San Augustine, Tex., asks bids until Jan. 26 for extensions and improvements in municipal power plant, including installation of 450-kw. diesel engine-generating unit and auxiliary equipment. H. B. Gieb & Co., Mercantile Building, Dallas, Tex., are consulting engineers.

Commanding Officer, Ordnance Department, San Antonio Arsenal, San Antonio, Tex., asks bids until Feb. 5 for one high-pressure jenny, portable type, with one gun unit, including electric ignition and nozzle control, fuel oil burner, pressure up to 150 lbs., streamline design (Circular 36).

Central Power & Light Co., San Antonio, Tex., is arranging immediate call for bids for new steam-electric generating station in Nueces Bay district, Corpus Christi, Tex. Cost over \$500,000 with equipment. Sargent & Lundy, Inc., 140 South Dearborn Street, Chicago, is consulting engineer.

City Council, Houston, Tex., has selected 15-acre tract of land at foot of Milby Street for site for new municipal incinerator plant, to be equipped for capacity of 150 tons. Cost about \$400,000 with furnace units, mechanical handling and other equipment.

◀ PACIFIC COAST ▶

Lockheed Aircraft Corp., Empire Avenue, Burbank, Cal., has let general contract to F. B. Aldous & Son, 8327½ Wilshire Boulevard, Beverly Hills, for one-story addition, to be known as assembly building No. 6, about 40,000 sq. ft. floor space. Cost close to \$100,000 with equipment. John and Donald B. Parkinson, Title Insurance Building, Los Angeles, are architects.

Los Angeles Water and Power Bureau, 207 South Broadway, Los Angeles, has approved plans for new one-story electrical and mechanical repair shop at 1630 North Main Street. Cost about \$563,000, of which approximately \$105,000 will be expended for equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 30 for storage battery charging equipment (Schedule 445) for naval air station, Alameda, Cal.; quantity of electric wire and cable (Schedule 437); until Feb. 2 for quantity of electric cable (Schedule 487) for Mare Island, Cal., yard; until Jan. 30 for 28 electric sirens and spare parts (Schedule 461); until Feb. 2 for ventilation diffusing type terminals (Schedule 465) for Puget Sound, Wash., yard; one motor-driven ram-type universal milling machine (Schedule 478) for Alameda air station.

California-Oregon Power Co., Medford, Ore., is arranging fund of about \$1,000,000 for expansion and improvements in plants and system in 1940, including transmission and distributing lines, power substations, switching stations and other structures.

Vultee Aircraft, Inc., Downey, Cal., has arranged for stock issue to total about \$2,550,000, majority of proceeds to be used for expansion and improvements in plant, specializing in production of pursuit-type airplanes and parts.

Administrator, Bonneville Project, Department of Interior, 811 N. E. Oregon Street, Portland, asks bids until Feb. 1 for quantity of insulated wire and cable for power substations of Bonneville transmission system (Circular 712).

City Council, Eugene, Ore., plans new steam-electric generating station with initial capacity of 7500-kw., to supplement present municipal hydroelectric power plant. Fund of \$510,000 is being arranged. Work is scheduled to be carried out in 1940.

◀ FOREIGN ▶

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, has secured concession from Government of Venezuela, Caracas, for construction and operation of new oil refining plant in Eastern Venezuela, where company has been developing a number of large oil wells under another concession acquired some time ago. Refining plant is stipulated to have capacity of 10,000 bbl. per day of crude oil, and will comprise several one and multi-story units, with steel tank storage and other operating facilities, including pipe lines. Construction is scheduled to be carried out soon.

Manitoba Sugar Co., Ltd., Winnipeg, Man., has let general contract to Carter-Halls-Aldinger Co., Ltd., Royal Bank Building, for new beet sugar refining plant at Fort Garry, Man., comprising several large one and multi-story production units, storage and distributing buildings, power house, machine and other mechanical shops, pumping station and miscellaneous buildings. Cost close to \$2,000,000 with machinery.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

... Most dealer centers report sales light in the past week ... Aircraft buying still a big factor in the East, and arsenal and navy yard buying continues ... Some automotive buying at Buffalo ... Factories operating at peak as foreign orders are well sustained.

Domestic Orders Off; Foreign Buying Sustained

CINCINNATI—Fractional decline in the machinery demand in this area was noted during the past two weeks. Most noticeable in the current easing has been the lack of interest in lathes generally, while bookings of other types of tools continue to be unusually active. Foreign ordering shows relatively no let-up while the domestic business has absorbed virtually all of the fractional decline during the past two weeks. Several automobile companies are actively in the present market and reports indicate that some ordering has already been placed. Export demand is coming from a wide area, with India and Sweden added to the steady demand of France, England, Japan and Russia. Most of the export business appears to be intended for armament programs, although the current week's demand reveals the purchase of some crankshaft equipment for shipment to France. Plant operations continue to run at full tilt, with a number of manufacturers now "farming out" business to less active factories in other areas.

Aircraft Activity Once More In the Spotlight in the East

NEW YORK—Were it not for increased activity in the aircraft engine and parts industry, some dealers would not be doing much business in the immediate area, although current inquiries are from wider sources. A much better volume of business is reported from dealers having sales offices in cities scattered throughout the East. Some machinery buying for 1941 production programs has helped to swell the totals of these. Arsenal and navy buying is well sustained. The submarine base at New London figured in recent orders.

Light Week of Sales For Cleveland Dealers

CLEVELAND — Producers here have shared generous foreign awards recently. Shipments continue at the highest peak in years, facilitated by expanded production facilities. Tooling remains the bottleneck, of course.

The past week, however, has been uneventful and disappointing for local dealers. Sales have been confined to single machines here and there. A number of fair-sized projects are pending, but some of them date back months and come from companies apparently determined to evade

the expenditures if at all possible. Activity at Detroit has slumped sharply.

Employment in machine tool plants continues to rise slowly. One company is operating two 11-hr. shifts with about 1700 men, and another has had considerable success breaking in new men from the ranks of applicants, starting them first in a "burr file" department where a close watch is kept for signs of aptitude.

Shipments in the past week include forging equipment for Russia. The same country recently placed a good sized order for taps and dies.

Little Machine Tool Business From Military Contracts

DETROIT—The number of military projects in this area is showing steady increase, with recent manufacturing orders going to Budd Wheel Co., Federal Screw Works, Bohn Aluminum & Brass Corp. and the Timken Detroit Axle Co., but so far none of these has been productive of a great deal of new machine tool business. However, one recent order for honing equipment placed for military engine repair bases is understood to total more than \$20,000. Volume of work has led to numerous expansions in tool and die shops in Detroit. Gage block business of the Johansson division of Ford Motor Co. is reported to have undergone sharp increases recently. Pur-

chasing is being done to equip a strip mill for Sheet Aluminum Corp., Jackson, Mich. An item of incidental interest at the present time is the announced plan of a Detroit group to build a pilot mill near Detroit for a new process that will make wire out of slit strip steel, aluminum or copper.

Army and Navy Continue To Buy Equipment

BOSTON—Commanding officer of the Springfield (Mass.) Armory is taking bids until Jan. 29 for one semi-automatic broach sharpener. The War Department has purchased a broach grinder from the Lapointe Machine Tool Co., Hudson, Mass.; a plain cylindrical grinder from the Norton Co., Worcester, Mass.; and engine lathes from Reed-Prentice Corp., Worcester.

The Navy Department has purchased six electric bridge cranes from the Harnischfeger Corp., Milwaukee, and a 140-ton diesel operated locomotive crane from the Orton Crane & Shovel Co., Chicago, both for the Charlestown (Boston) Navy Yard.

Chicago Dealers Report Light Sales in Week

CHICAGO—Only a few orders for machine tools have been closed in the past week by Chicago sales offices. This lull in new business was not altogether unexpected and sellers still regard the future with optimism. A fair number of inquiries is being received, some of the more prominent customers now in the market including John Deere, the East Moline plant of International Harvester, and the Rock Island Arsenal. The arsenal is interested in a 12 or 14-in. precision tool room lathe plus equipment, a pull-up type broaching machine and a gear cutting machine. Sales of small tools are about on a par with the corresponding period last month. As yet, there has been no noticeable improvement in the delivery situation. No definite information with regard to the Nash program has been reported in the past week, but current interest remains centered in that project.

... GREAT BRITAIN ...

Steel industry intensely busy ... Non-priority orders delayed

LONDON, Jan. 23 (By Cable)—Intense activity still prevails in British iron and steel and delivery delays on non-priority orders have been extended. Only priority orders are accepted for definite dates.

Home price alterations now considered unlikely at present.

Basic pig iron output will be augmented to 10,000 tons monthly by the starting of a new furnace, but it will all be earmarked for Associated Steel Works.

It has been unofficially reported that British economic warfare is causing some German steel works to cease operations through inability to obtain raw materials.

The Continent reports an easing in pressure in new business, but it is regarded as a normal feature after the intensive buying during the first half of January. Works are declining new orders except for defense purposes. Prices are a secondary consideration.

Welsh tin plate activity has been maintained though it is difficult to obtain permits in some countries. The Government is urging makers to restrict home orders for delivery beyond June.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

Figures in italics are 10 months' totals

	December 1939	November 1939	October 1939	November 1938	11 Months 1939	11 Months 1938
Steel Ingots: (gross tons)						
Monthly output ^a	5,164,420	5,462,616	5,393,821	3,558,363	40,604,479	24,611,479
Average weekly output ^a	1,168,421	1,273,337	1,217,567	829,455	850,890	515,747
Per cent of capacity ^a	85.57	93.26	89.17	61.81	62.32	38.44
Pig Iron: (gross tons)						
Monthly output ^b	3,768,336	3,720,436	3,627,590	2,269,983	27,765,034	16,571,508
Raw Materials: (net tons)						
Coke output ^c		4,912,773	4,782,202	3,444,223	39,393,326	29,194,847
Lake ore consumed ^d (gross tons)		5,477,969	5,270,707	3,150,073	38,822,915	22,662,350
Scrap iron consumed ^e		4,025,000	3,974,000	2,732,000	31,201,000	19,117,000
Castings: (net tons)						
Malleable, orders ^f		51,778	63,835	36,643	443,504	253,751
Steel, orders ^f			119,687	30,428	518,161	264,508
Finished Steel: (net tons)						
Trackwork shipments ^a	7,355	6,640	5,658	2,514	61,895	34,496
Fabricated shape orders ^f		91,556	112,597	153,084	1,206,662	1,093,194
Fabricated plate orders ^f		25,995	37,776	20,213	333,741	256,843
U. S. Steel Corp. shipments ^g	1,304,284	1,270,894	1,218,545	679,204	9,347,866	5,931,164
Fabricated Products:						
Automobile production ^h		350,000††	323,017	390,350	2,920,161††	2,248,681
Steel furniture shipments ^o		\$2,142,154	\$2,103,594	\$1,706,772	\$20,316,311	\$16,667,178
Steel boiler orders ^a (sq. ft.)		800,821	1,089,288	635,108	10,543,308	6,837,333
Locomotives ordered ⁱ	127**	41	34	3	288	133
Freight cars ordered ⁱ	4,381**	7,691	11,220	132	52,534	11,973
Machine tool index ^j		91.2	84.9	*	67.9	*
Foundry equipment index ^k	164.8	192.2	220.4	89.7	199.2†	85.4†
Non-Ferrous Metals: (net tons, U. S. only)						
Lead shipments ^l		64,365	66,000	42,005	510,193	387,717
Lead stocks ^l		58,061	191,453	15,134	.....	.....
Zinc shipments ^m	53,468	64,407	73,327	43,693	545,504	356,200
Zinc stocks ^m	65,995	61,522	72,405	126,769	.....	.....
Tin deliveries ⁿ (gross tons)	11,366	7,870	6,040	3,535	60,530	47,260
Refined copper deliveries ^o		*	*	64,657	*	559,392
Refined copper stocks ^o		*	*	269,488	.....	.....
Exports: (gross tons)						
Total iron and steel ^p		605,555	591,856	646,157	5,475,992	4,658,041
All rolled and finished steel ^p		208,233	160,105	120,610	1,602,514	1,269,697
Semi-finished steel ^p		74,868	35,501	29,730	250,257	231,494
Scrap ^p		271,293	334,664	448,020	3,347,291	2,653,114
Imports: (gross tons)						
Total iron and steel ^p		15,216	19,189	27,627	300,452	235,783
Pig iron ^p		2,774	5,077	1,493	37,274	31,851
All rolled and finished steel ^p		4,398	4,293	12,554	153,361	142,761

†Three months' average. *Not available. ††Preliminary. **Includes yearly adjustments.

Source of data: ^aAmerican Iron and Steel Institute; ^bTHE IRON AGE; ^cBureau of Mines; ^dLake Superior Iron Ore Association; ^eBureau of the Census; ^fAmerican Institute of Steel Construction; ^gUnited States Steel Corp.; ^hPreliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; ⁱRailway Age; ^jFoundry Equipment Manufacturers Association; ^kAmerican Bureau of Metal Statistics; ^lAmerican Zinc Institute; ^mNew York Commodity Exchange; ⁿCopper Institute; ^oDepartment of Commerce; ^pBritish Iron and Steel Federation; ^rInstitute of Scrap Iron and Steel.

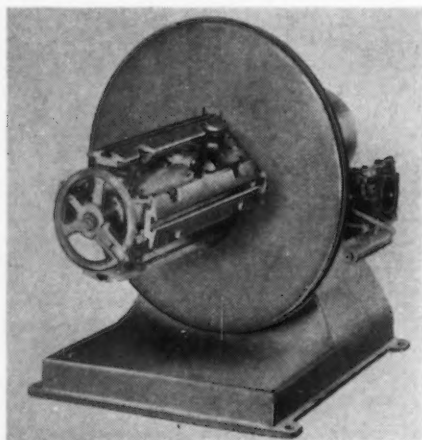
What's New In Presses

(CONTINUED FROM PAGE 45)

recessed in such a manner that too much stock cannot be fed to the cutting edge, automatically providing the allowable rate of feed and preventing stalling. The front head can be turned either to right or left and set at an angle of 30 or 90 deg. when space limitations of the work make this arrangement desirable. The 2½-in. diameter of the motor housing serves as the handle of the nibbler and its small size makes it easy to follow any contour. Weighing only 3¾ lb., it is readily maneuverable.

Reels for Coil Stock

SEVERAL designs of reels for unwinding and rewinding light gage coil stock have been announced in

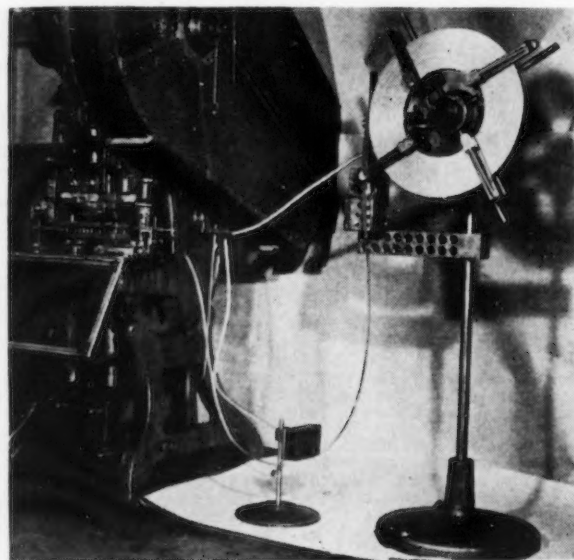


LITTELL No. 40 automatic centering reel for light gage stock in coils weighing up to 4000 lb. and up to 20 in. wide. May be used in connection with punch press feeds or as an unwinder for a slitter.

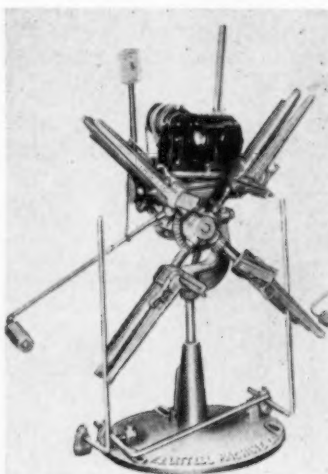
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RIGHT

A SOLENOID actuated pawl and a friction braked ratchet are the principal parts of the Simplex stock reel, made by J. A. Honegger, 223 Spruce Street, Bloomfield, N. J. This reel was originally developed to work in conjunction with the 12-station cut-and-carry die shown in the press. To reduce the tension in the strip when using a simple pull type of feeding arm, a sensitive counterbalanced actuating switch, shown on the floor, was also developed for use in conjunction with the solenoid. The only resistance to the pull of the feed arm was the friction in the stripper and the weight of the counterbalanced switch arm.



recent months by the *F. J. Littell Machine Co.*, 4127 Ravenswood Avenue, Chicago. The No. 40 automatic centering reel illustrated, for handling coils up to 4000 lb., is designed to



LIGHT duty automatic centering reel for use with automatic punch presses. This type 3G Littell motor driven reel provides a loose loop of material for the feeding equipment. Will handle light gage material in coils up to 300 lb.

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prevent the rolling of the edges which often occurs in winding light gage strip in a cradle type machine. When used in conjunction with punch press feeds, a 3-hp. motor is used to drive the reel, but when the unit is employed as an unwinder for slitters, a large brake is substituted for the motor.

Winding drum has an expansion range from 14½ to 16½ in. For larger coils, chairs can be provided. Reel is mounted on an all steel welded base.

Also illustrated is an automatic centering reel of light duty for unreeling light gage coil stock into high speed automatic punch press feeds, in coils weighing up to 300 lb. In the same capacity, the Littell company is supplying a plain reel with arms, a plate type reel and a scrap winder. These reels have among other features, adjustable brakes, Mercoid loop controls, and are driven by ¼-hp. geared head motors through V-belts. Reels can be used for unreeling stock from right to left or vice versa, and can be tilted to any angle. They are adjustable for height and are fully equipped with anti-friction bearings.

British Collect 80,000 Tons of Scrap in Nation-wide Canvass

LONDON — Britain's nation-wide scrap iron and steel canvass launched two months ago has so far brought in about 80,000 tons. This is equivalent to about a dozen average cargoes, and liberates that amount of shipping for other essential imports. The tonnage represents gleanings from thousands of factories and workshops. Some 150,000 industrialists received a letter pointing out the urgent national need for scrap. When dumping and collection arrangements are assured outlying agricultural regions will be combed more thoroughly.

Metal Plant Directory

A REVISED edition of the Standard Metal Directory, containing more than 11,000 detailed reports on metal working plants in the United States and Canada, has been published by Atlas Publishing Co., 150 Lafayette Street, New York.

The 600-page directory is divided into four special sections embracing iron and steel plants, ferrous and non-ferrous foundries, metal rolling mills, and smelters and refiners of non-ferrous metals. Other lists cover pig iron, ore and alloy producers and distributors, scrap dealers, die casting plants, trade associations, sheet metal stamping works, etc. Each company listing gives location of plants, officers, plant equipment, products, capacity, materials consumed, and various financial details.

Copies of the directory are available from the publishers at \$10 each.